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The Rubber Roadway and the Prophets

ONE of the experts in a great Akron rubber company writes regarding rubber roadways: "It is our judgment after considerable investigation that while rubber paving is a spectacular and beautiful thought it is not practical."

This is undoubtedly the opinion of a majority of rubber manufacturers. Indeed, the only safe policy, in an industry where hundreds of new and alluring but wholly unpractical avenues are ever opening for rubber extension, is negative. A decision of this sort in steel, lumber, or any industry other than the rubber industry would be final, but not in rubber. Each revolution in rubber has first been thought either unpractical or impossible by those who know most about the industry.

The wise scoffed at Goodyear's experiments and at his early vulcanized products.

In 1906 the foremost American rubber manufacturer, after a conference with his experts, went on record to the effect that rubber plantations in the Far East were simply governmental experiments and their product would never affect the crude rubber market.

That the pneumatic tire for motor vehicles would be of commercial value was long denied. Edison believed that at a speed of thirty miles an hour the fabric and the rubber would separate and the tire go to pieces.

One of the most brilliant of rubber manufacturers after consulting with his practical men and chemists came out flatly with the statement that not as much as ten pounds of synthetic rubber would be made in the next fifty years.

The largest of the rubber importers, when rubber was $2.50 a pound, affirmed that the price would never again go as low as $1.00 a pound.

The object of these remarks is not, however, to emphasize mistaken opinions but rather to draw renewed attention to rubber roadways. A recent article in *Tropical Life* (British) calls attention to the fact that the stability of the spire of the Salisbury Cathedral, said to be the highest in England, is seriously threatened by the vibration from heavy traffic. That it could be made safe by the proper type of rubber roadway goes without saying. That hundreds of analogous cases are to be found in nearly all great cities is a fact. It is, therefore, as a panacea for dangerous vibrations in lofty office and public buildings and bridges that the rubber roadway will find its first considerable use. The fact that the practical see nothing in it is a most hopeful symptom.

As to a Goodyear Memorial

AT semi-frequent intervals some individual, in or out of the rubber trade, urges a memorial to the memory of the inventor of vulcanization. That the idea is excellent is never contradicted. But in spite of spasms of interest, occurring about once in ten years, nothing has yet been done. This is perhaps because so many places have been urged, each possessing definite claims for consideration.

When the Honorable L. D. Apsley was president of the New England Rubber Club he was definitely committed to Boston as the ideal place. In that city Goodyear made his momentous discovery. The pioneer rubber factory was located there. Even the old firm of druggists from whom Goodyear purchased hundreds of ingredients for his experiments is still in existence. Thus the New England city presented a strong claim.

Due south from Boston many nautical miles, the city of Pará asked for recognition. Dr. Jacques Huber believed that a Goodyear memorial in the Musee Goldei in the Brazilian rubber city would be of international interest

and value. Lacking Goodyear's discovery the great rubber development in Northern Brazil would have been impossible, and, conversely, without the prolific Hevea the rubber business would have been of slow development.

The university city of New Haven, Connecticut, Charles Goodyear's birthplace, is suggested by others and has unquestioned merit.

With the erection of the beautiful museum at Bronx Park, New York, N. Y., there was assembled an excellent rubber collection which is still on exhibition. This is often mentioned as a nucleus for a Goodyear memorial.

The rubber city of Akron also put in its claim. That it had merit all agreed except one who objected that the world at large would believe it to be an advertisement of the local company bearing the Goodyear name.

The United States Rubber Company, without mentioning Naugatuck, Connecticut, as the place for such a testimonial, placed a very excellent bust of the inventor in that city, thus really doing the first thing toward Goodyear remembrance.

Another plan is a joint appreciation of Goodyear and Hancock, the place to be London or New York as the sponsors may decide. Thus the two countries whose rubber interests are so closely interwoven would add another and unique bond of fellowship.

The latest place, and some say the best, is the National Museum at Washington. It is slightly away from the rubber activities, and has none of the atmosphere of the inventor's early struggles and eventual triumphs. It, however, belongs to the nation, as did Charles Goodyear. The strongest point in favor of the Washington location is this. All of the rubber men know who Charles Goodyear was and what he did. But the great mass of Americans do not really know whether he is a calender man in the factory of the Goodyear Tire Company, or the alert and migratory Hebrew who features the bankrupt sales of the Goodyear Raincoat Company. All, however, go to Washington, and to the National Museum, and there they would learn.

Cheap Synthetic Rubber Soon

A FIRM believer in the probability of large scale production of synthetic rubber in the near future is Professor Gabriel A. Bobrick of California, a chemist of fifty years' experience who has devoted much time to the synthesis of rubber and the study of the problems involving the disassociation and rearranging of hydro-carbon compounds. Some of his processes have already been acquired by rubber manufacturers in America.

In his opinion there is nothing mysterious or infeasible about building up, not merely theoretically but practically from ultimate elements, a molecule that will not only be isomeric with the original caoutchouc molecule but will also have an atomic arrangement that will impart to it properties identical with those of native rubber. He is sure that a process will be developed for the economical catalytic hydrogenation of carbon and for suitable polymerization of the made molecule to give desired results; which method will compare, for instance, in practicality with the commercially successful hardening of cheap vegetable oils in which hydrogen atoms are readily added to the oleic acid molecule to convert it into that of stearic acid.

How then will commercial synthesis of rubber be achieved? It will be done, he says, by first isolating and then suitably combining the simple component elements of rubber, carbon and hydrogen as they occur so abundantly in nature, instead of waiting years for a plantation to develop or depending upon the familiar laboratory processes. He is not prepared to say yet whether the hydrogen will be produced by steam passed over incandescent coke or metal, as in the making of water gas, and then purified and stored in gasometers; or whether it and the needed carbon will be abstracted from petroleum or some other hydrocarbon. At any rate, he sees no reason why hydrogen may not be made amply and cheaply, just as the modern method of oxygen production by distillation and condensation has replaced the meager old-time output of the laboratory. As for carbon, there are many sources of materials available, such as natural gas, sawdust, and other wood refuse, etc.

The enormous expansion of the nitrogen-fixation process is regarded as but a forerunner of other and equally important chemical developments that will before long deeply affect the rubber as well as other industries. Before 1914 scarcely 10 per cent of the world's nitrates were produced from atmospheric nitrogen. Today that percentage is up to 30. If, as is claimed, most proteids contain about 16 per cent of nitrogen, it may be possible through nitrogen-fixation to even supply (with other elements) that peculiar "something," believed to be a proteid or perhaps a resin or both, which seems necessary to give synthetic rubber "life" and to facilitate its vulcanization, and the lack of which caused it to be regarded as "too pure" to be useful.

THAT BRITISH RUBBER PLANTERS HAVE A RIGHT TO SELL their product at whatever price they like would seem to be self-evident. Nor should it stir rubber manufacturers who sell their wares for all they can get. There should be no anger on the part of the British rubber planters because Americans bought as cheaply as they could. Nor should there be revengeful thoughts in the minds of American buyers because of the price advance. F. O. B. should never be interpreted "Free of Britain." None of us really desire that. The threat of huge new plantations for the sake of coercion or revenge is unworthy, and is not good business. The promise of big plantations because of a future scarcity of rubber, however, is perfectly sound.

"EVERY MAN THAT STRIVETH FOR THE MASTERY is temperate in all things." 1 Cor. 9:25.

Pará Rubber Can Be Grown in Mexico

A Possible Source of Standard Plantation Rubber Across Our Southern Border

ALTHOUGH *Castilloa elastica* is the native rubber tree of Mexico and Central America and formed the basis of the first rubber plantations there, numerous extensive experiments have shown that *Hevea brasiliensis*, with its greater yield of better rubber, can be successfully cultivated in southern Mexico. Revolution and civil war in that country during the past decade halted the extension of Hevea planting so auspiciously begun from 1907 to 1913, and greatly damaged and in certain instances practically destroyed some of the promising pioneer estates. Abandonment and neglect since then, owing to uncertain conditions and financial difficulties, have wrought further havoc. But it has been proved conclusively that Hevea rubber can be grown successfully in the states of Vera Cruz, Oaxaca, Tabasco, and Chiapas on the Isthmus of Tehuantepec, despite the somewhat drier climate than in Central and South America. Therefore with stable government re-established, our sister republic beyond the Rio Grande again becomes a possible source of standard plantation rubber.

The Ravages of Civil War

Overridden as they were for several years by bandits and rival political chieftains, rubber and other plantations in southern Mexico suffered heavily. Some estates along the Isthmus line of railway, running from Cordoba to Santa Lucrecia, were so plundered and damaged that nearly all of them were abandoned by their legitimate owners. For example, El Palmar, the first

Hevea Brasiliensis at El Palmar

Hevea estate in Mexico, near Tezonapa, in the state of Vera Cruz, was for some time occupied as the headquarters of Panuncio Martinez, one of the most dangerous and heartless bandits of all, and with other neighboring estates, including La Union, belonging to Isidro Barrios y Cia., was finally destroyed by Carranzista forces in order that Martinez might not use it as a shelter or base, that being one of the ruthless methods employed in pacifying the country.

The large Hacienda de Montepio, near San Andres Tuxtla, in the southern part of the state of Vera Cruz, owned by Senator Clark, suffered comparatively little. Although it was looted of

Hevea Brasiliensis at Buena Ventura

its horses, mules, and implements, and the American manager had to run, the estate was left under the care of a Cuban foreman.

Hevea Pioneering at El Palmar

El Palmar, located near Tezonapa, Vera Cruz, on the Vera Cruz & Isthmus Railway, a plantation once owned by the French firm of Lions Hermanos y Cia., of Puebla, and afterwards the property of a British company known as El Palmar Estates, Limited, of Glasgow, Scotland, has the distinction of having been the pioneer in the experimental cultivation of *Hevea brasiliensis* in Mexico. This was undertaken upon the recommendation and under the supervision of the late J. C. Harvey, its resident manager.

In a garden on his own private estate, Las Palmas, near Buena Ventura, on the Isthmus of Tehuantepec, where he had formed a splendid collection of tropical flora, both ornamental and economic, Mr. Harvey raised fourteen Hevea trees from twenty seeds procured from Dr. Henry S. Ridley, late director of the Botanic Gardens at Singapore. These were destroyed by deer during Mr. Harvey's absence, but in 1907 he obtained and planted more seed both at Las Palmas and El Palmar.

When the second lot of trees had matured under his devoted care and observation he began a series of experimental tappings, the results of which confirmed his belief in the suitability of certain sections of southern Mexico to the introduction of the Hevea, adaptable, as it had seemed in the East, to physiographic conditions differing widely from those of its natural habitat in Brazil.

This was in 1913 when the trees were six years old and varied in girth from 19 to 26 inches at 2½ feet above the ground. On daily tapping on the single half spiral plan embracing half the circumference of the trees, wound response was just as well marked and apparently as certain as elsewhere. The average yield of dry rubber was about 4 grams per day per tree, or for 285 tapping days 1.140 kilograms per tree per year, this allowing for no tapping on Sundays, holidays, or during the dry months

of April and May. Later this yield was amply confirmed during the height of the dry season. At El Palmar the yield was better, varying from 8 to 12 grams per tree per day.

Samples of this rubber, probably the first Pará rubber produced in Mexico, were that year sent to THE INDIA RUBBER WORLD and found to be equal to the best plantation product of the Middle East. Thereupon Mr. Harvey resolved to reconstruct his own property in cacao, coffee, and Hevea rubber, and advised the owners of El Palmar to go into rubber also, which they did.

Field Planting at El Palmar

The first planting of Hevea at El Palmar, on regular field lines, was begun in 1911 with several thousand stumps imported from Ceylon. Upon arrival these were put into nurseries, and after they had become acclimatized and fairly well established were transplanted to the field. The proportion of plants which survived the preliminary nursery stage was not as good as had been expected, and 10,000 seeds were subsequently obtained from the government botanical station at Peradeniya, Ceylon. These were sown in nursery beds, about 70 per cent germinating. Until the removal of the 7,000 plants to the field they were carefully guarded against every potential danger. When five months old they averaged 3 feet in height, and four months later were twice as high, with a considerable proportion 9 feet high with a girth of 2½ inches one foot above the ground.

Later a consignment of 100,000 seeds was obtained, and in September, 1914, there were 50,000 thrifty Hevea trees at El Palmar bearing every promise of success, the largest of them, four years from seed, measuring 24½ inches in circumference one foot above the ground. Growth was vigorous and healthy, although not quite as rapid as in equatorial regions lacking a fairly well marked dry season. Apparently this has its compensations, however, for during such a dry season many forms of mycelium and various bacterial germs are destroyed or reduced to a minimum, while bark formation is relatively solidified and wounds heal with less liability to rot, thus reducing the risk of insect or other attack upon the cortex.

Experimental Plantings Elsewhere

Early experiments in Hevea cultivation were also conducted by C. M. Harvey, superintendent of the American-owned estate of San Silverio, in Oaxaca, of which J. C. Harvey was the consulting expert. Results were as encouraging as at El Palmar. The tappings of the first trial trees averaged ¼-pound of dry rubber per month per tree for a year. Seed was then obtained from Ceylon, propagated in nurseries, and in 1913, in the absence of Mr. Harvey, five to ten thousand young trees were set out by J. L. Hermessen.

The Hevea seedlings were interplanted with young Castilloa, a practice which Mr. Harvey had originally adopted on his own private estate of Las Palmas with beneficial effect, he thought, the indigenous tree affording the supposedly more delicate exotic some protection against the phenomena of the dry season, characterized as it is on the Isthmus of Tehuantepec by a relentless sun and spells of a riotous hot south wind lasting for days at a time.

Other Mexican estates upon which successful plantings of Hevea have been made are La Buena Ventura, on the Isthmus of Tehuantepec; Batavia, in the district of Tuxtepec, in the state of Oaxaca; El Chival and Hular Ramirez, in the state of Chiapas. At La Buena Ventura a 5-year-old Hevea measured 20 inches in circumference three feet above the ground, while at Batavia growth was satisfactory in a clay soil.

To promote trials of Hevea cultivation under varying physical conditions the Mexican Government in 1911 imported several thousand Hevea stumps for free distribution in lots of 50 to 500 to all *bona fide* applicants.

Good Climatic and Soil Conditions

Considerable areas await selection as suitable for Hevea planting in tropical Mexico. While much intelligent care must be devoted to the selection of land and consideration must be given to the available labor supply, experience indicates that Hevea is far less capricious or exigent in its soil requirements than the indigenous Castilloa, given the requisite temperatures and rainfall. There are numerous instances in which it has thrived where Castilloa did not do well. Given a soil sufficiently deep and granular in character to provide adequate capillarity from the lower water level, the best growth is attained with a moderate and well distributed rainfall ranging from 90 to 120 inches per annum, and both rainfall and temperature in many sections of tropical Mexico are generally suitable for Hevea.

The soil at El Palmar is the regular Cordoba coffee soil, a chocolate colored granular soil underlaid by a bright red porous clay. At Buena Ventura it is a dark loam underlaid with a light yellow somewhat porous clay, at San Silverio a very dark clay loam underlaid at varying depths with a light colored stratified clay, and in some instances with a rotten shale-like formation into which many tree roots penetrate and upon which Hevea flourished.

Of the characteristic growth of Hevea in Mexico, J. C. Harvey wrote to THE INDIA RUBBER WORLD[1] as follows in 1913:

> The phenomenon of foliar periodicity, both terminal and lateral, is as well marked here in Mexico as in the Orient, occurring at various intervals throughout the year, complete defoliation rarely lasting more than a fortnight, often much less and in some instances new growth occurring synchronously with the fall of the older foliage. In this district—southeastern Mexico—the partially deciduous period may be said to occur during April and May, the driest months of the year, the deciduous character being more marked as the trees attain age.
>
> The aspect of poorly developed heads, yellowing of foliage—indicating a want of chlorophyl and caused no doubt by defective root nutrition—atrophy of lateral branches and die-back of tops, as seen in some localities here in Mexico and elsewhere, as so commonly affecting Castilloa, is entirely absent in Hevea, though growing in the same localities.

One Enemy to Hevea in Mexico

Vegetable parasites affecting Hevea, such as the deadly *Fomes semitostus*, and destructive insect pests, such as *Termes gestroi*, the ravages of both of which have been a serious menace to rubber plantations in the East, do not exist in Mexico. The Mexican termite, known as the "comején," attacks only dead wood and so does not endanger living trees. In some places deer have evinced a liking for the bark of young Heveas, but this is neither a common nor a serious danger.

There is, however, one enemy to Hevea that must be seriously reckoned with in Mexico and Central America. It is the *Geomys busarius*, called the "tusa" or "taltusa" in Mexico and the pocket gopher in the United States. The species occurring in Mexico is larger than the North American species, but identical in habits. A rat-like rodent which burrows in the ground, it eats with avidity the roots of Hevea, Castilloa, cacao and other plants, especially those containing starch, such as the banana.

It may be disposed of quite effectively by trapping, digging out or poisoning; and the best time for its almost entire destruction is immediately after the felled first growth has been burned, while the surface is as clean as may be and all evidences of burrowings visible.

Summary

In conclusion it may be said without fear of contradiction that, setting aside the neglect and destruction due to several years of political chaos below our southern border, there is no record that any Hevea planting within the tropical rain forest districts of northeastern Mexico has failed to flourish, with the possible exception of a few experimental trees here and there, which, owing to lack of interest in them, have been killed by gophers or deer. That this region is apparently well suited to Hevea cultivation therefore seems evident.

[1] THE INDIA RUBBER WORLD, October 1, 1913, 7.

Bud-Grafting of Hevea Brasiliensis

Anatomy of Hevea—Relation Between Types and Yield—Factors in Bud Selection—Practical Budding Methods

By G. E. Perry[1]

WITHIN the last few years some of the more progressive groups of rubber plantations in the Far East have been devoting considerable time and attention to the practice of bud-grafting Hevea trees in order to obtain a strain which would have a greater latex bearing capacity and possibly a greater resistance to fungous diseases. This interest was brought about more or less by the results of several series of investigations on the variation of the latex bearing qualities of individual trees. It was generally found that about 40 per cent of the trees in a given area were producing about 75 per cent of the total crop. The remaining 60 per cent were indifferent or poor yielders. It is impossible to avoid conditions of this nature when planting up new areas by the usual methods, as there is no known method of predicting the future yielding capacity of a seedling. At present the production of an average tree for one year is between 4 and 5 pounds of dry rubber, but cases are known of trees producing as high as 40 or 50 pounds, and one instance of 70 pounds per year.

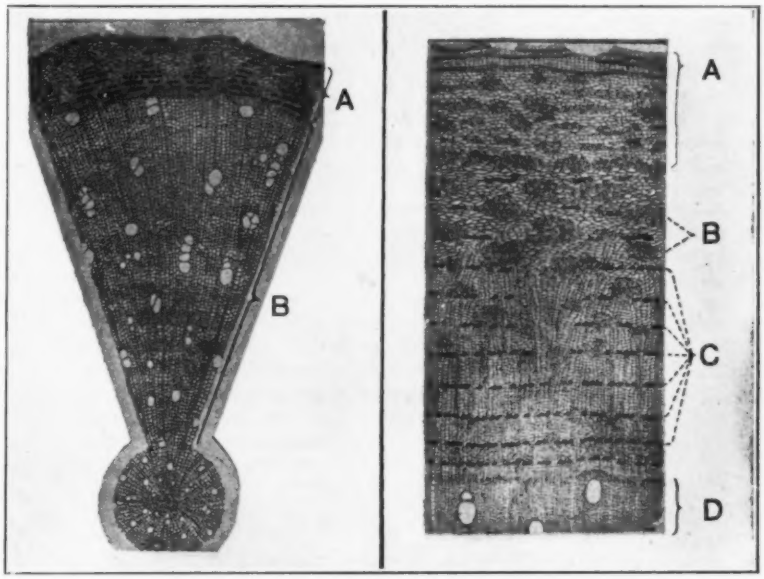

Fig. 1. Transverse Section of Stem

Fig. 2. Transverse Section of Cortex

It is generally accepted that good yielding trees remain good yielders and poor yielders remain poor yielders. With this in mind, buds from high yielding trees are grafted to one-year-old seedlings in the nursery and subsequently transplanted to the field. A bud reproduces the characteristics of a mother plant, therefore it is reasonable to expect that a bud from a high yielding tree would produce a tree of similar latex yielding characteristics. The preliminary results obtained by a few Dutch scientists in the Netherlands East Indies have proved sufficiently encouraging to stimulate further investigation along these lines.

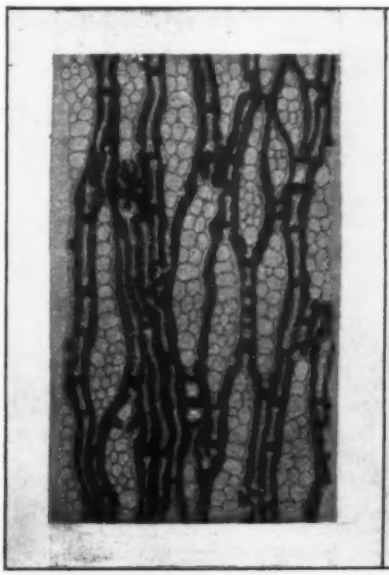

Fig. 3. Tangential Section of Cortex Showing Latex Vessels

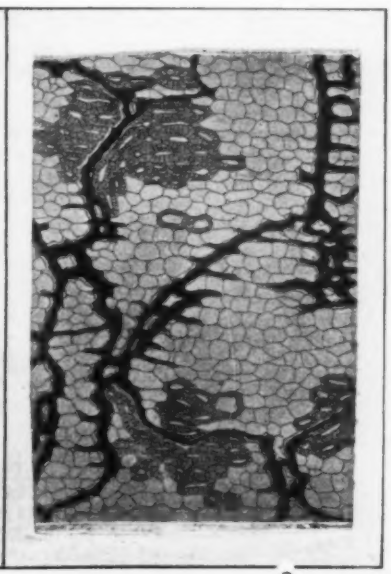

Fig. 4. Tangential Section of Outer Bark, Showing Latex Vessels

The Anatomy of Hevea Brasiliensis

In consideration of the anatomy of the *Hevea Brasiliensis*, the accompanying illustrations give a good idea of the occurrence and arrangement of latex vessels in the cortex. Fig. 1 represents a transverse section of a Hevea stem or trunk in which the cortex and latex bearing tissue are shown at A and wood tissue at B. Fig. 2 is a transverse section of the cortex, A being the outer bark, B groups of stone cells occurring throughout the cortex, and C rows of latex vessels. D is wood tissue separated from the cortex by the cambium. Fig. 3 is a tangential section showing the latex cell arrangement up and down the bark. Fig. 4 is also a tangential section cut from the outer bark.

[1]The author of this paper, who is a graduate of the Massachusetts Agricultural College, spent several years in the Far East where he specialized in bud grafting. He is now connected with F. R. Henderson & Co., Inc., New York, N. Y.

The rubber latex system is, of course, quite apart from the sap system of the tree. The definite function of latex is not clearly understood, as it may be a waste product or it may serve as a reserve food.[2] The periodic removal of latex in moderate quantities, even over a period of twenty years, does not seem to interfere in any way with the normal growth and development of the tree.

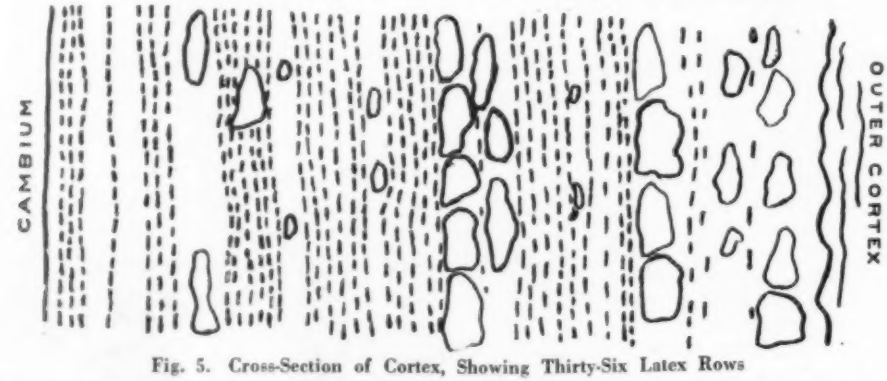

Fig. 5. Cross-Section of Cortex, Showing Thirty-Six Latex Rows

For a closer consideration of the anatomy of Hevea Dr. Bobilioff[3] states in part, that if a cross section is made through a Hevea stem we can see with the naked eye three distinct parts. In the center we find the medulla, which is surrounded by the wood; this forms the chief part of the cross section. Around the wood one sees a small ring, the cortex or bast. The cortex is easily removed from the wood, and there is found between the cortex and the wood a specially organized tissue called the cambium.

The cambium consists of a few rows of cells. Because of its function it is one of the most important of the plant tissues; it possesses the power of dividing and in this way forming new cells. These cells formed by the splitting up of the cambium cells form in their turn new tissues whose function depends on the position in which they arise. The cambium lies between the cortex and the wood; it divides and lays down cells on both sides, wood cells toward the interior and the cortex cells toward the outside. The plant's thickness in growth is due to this functioning of the cambium. The latex vessels are met with in the cortex; but since the cortex is laid down originally by the cambium it can be stated that the latex cells also have their source in the cambium. At the same time it is obviously apparent that for the formation of a large number of latex vessels a good healthy cambium is necessary.

From the medulla, rays called medullary rays are seen radiating out through the wood, cambium and cortex. Their structure is the same in the three parts, so that it is assumed that their function must be the same in all three parts.

The cortex is not built up uniformly, the different tissues therein being easily differentiated. At the outside we find the corky layer, then further in comes the cortex area that is filled up with cells whose walls are thickened. These are the so-called stone cells.

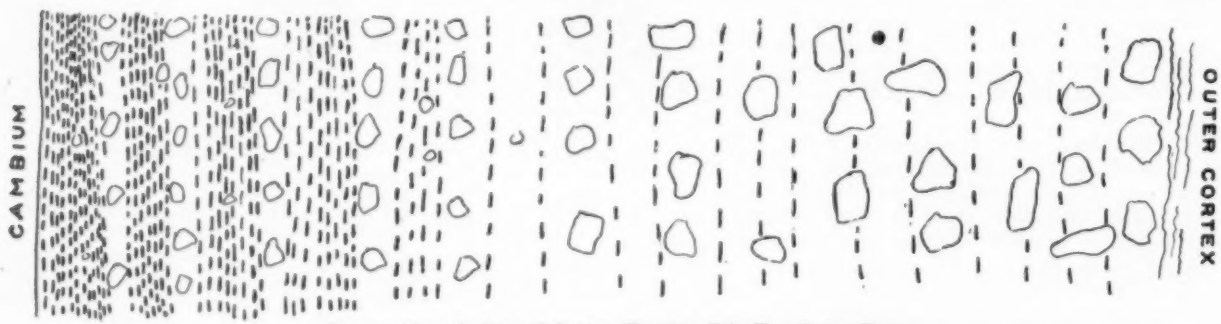

Fig. 6. Cross-Section of Cortex, Showing Fifty-Two Latex Rows

Since this area offers resistance to cutting, it can be referred to as the hard portion of the cortex. Further in and bordering on the cambium layer comes a portion of the cortex that has the largest proportion of latex rows, and since this portion offers but little resistance to the course of the medullary rays it is very easily observed, this being due to the long rod-shaped cells

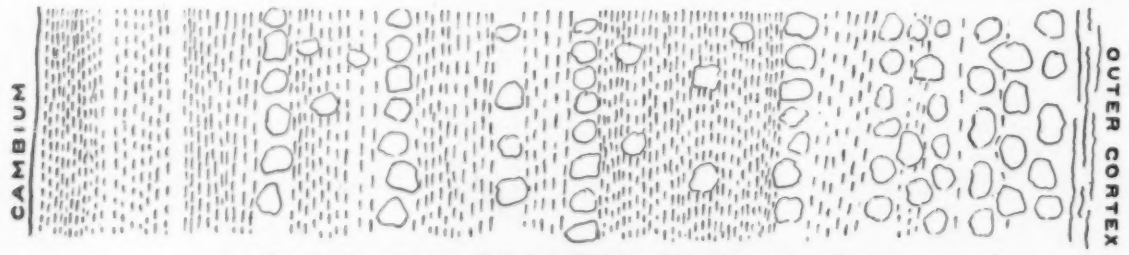

Fig. 7. Cross-Section of Cortex, Showing Ninety-Five Latex Rows

[2] Archief Vol. 2 No. 7.
[3] Dr. W. Bobilioff in Archief voor de Rubber-cultuur, December, 1922, considers latex as an execretory product.

of the rays as distinguished from the roundish cells of the rest of the area. The rays lead out from about uniform intervals. The spaces between the rays are filled with round cells; at regular and definite intervals occur in here rows of cells which are filled with a darkish content, which are cross sections of latex vessels.

Since the cortex in a cross section of the stem forms actually a ring about the wood, the rows of latex vessels in a complete cross section appear also to be concentric rings. In a small cross section of the cortex, such as we look at under the microscope, we cannot follow the complete course of the rings of latex cells, so that we are justified in calling them rows of latex vessels. Latex vessels lying in different concentric circles are in no way mutually connected with each other.

Individual Types and Latex Yield

An investigation of a large number of cortex samples at once suggested that types quite divergent in characteristics could be established, owing to the large differences in the order of anatomic elements. These differences were so pronounced that it was decided to try to see if it were possible to establish any relation between the individual types and latex yield.

In the softer internal part of the cortex the rows of latex vessels occur quite regularly. In the hard portion where the stone cells predominate, rows of latex cells are also met with but are interrupted here by the stone cells. In order thus to judge the quality of the cortex it is necessary to know how the stone cells divide and just how they break into the rows of the latex cells. The boundary between the hard portion of the cortex in which the stone cells occur and the soft part that contains most of the latex rows is not always a sharply drawn one. It very often occurs that stone cells are also met with in this soft part. In this case the stone cells lie spread very much about, and the quality of the cortex can thereby be influenced in two ways. In the first place, on account of the interruption (breaking into) of the latex vessels; in the second place, on account of the influence on the function of the medullary rays. For in the wood cells *starch is stored*, which in fact acts as a reserve food for the tree. If this starch is needed at any given moment it is led to the cortex along the channels furnished by the medullary ray. If, now, these medullary rays or channels are broken into or blocked up by stone cells the transport of food from the wood or reservoir to the cortex part needing it is made impossible for a certain distance around them. If still we assume that the formation of latex takes place at the expense of such reserve stuffs present in the wood, then it goes without saying that any interruption or blocking up of medullary rays by stone cells can only be a great disadvantage. Such a conception respecting the formation of latex is until now only hypothetical, but it is probably true.

Selection of Mother Trees

In the selection of trees from which to take buds for propagating seedlings a great many factors must be taken into consideration. Ordinarily the first step is to measure the yield of each tree on the estate once a month for at least a year. The yield is scratched so that a glance is sufficient to classify it. At the end of a measuring period the high yielders are easily selected and marked. A section of bark is removed from each of these high yielders and taken to the laboratory for miscroscopic examination. This examination reveals the exact number of rows of latex vessels present. The average 10-year-old tree has from 15 to 20 rows of latex vessels. The number increases with the age of the tree up to a certain point, depending on the structure of the cortex.

A diagrammatic drawing is made of a section of bark taken from each tree in order to determine the type of the cortex or bast. This type is determined by the number and arrangement of the rows of latex vessels. For instance, in the process of tapping the tree a millimeter or two of bark adjacent to the cambium cannot be touched for fear of wounding the tree. Therefore, if the latex vessels are bulked too near the cambium they are not available for tapping. Fig. 6 shows this condition. Fig. 5 has a less number of latex vessels, but they are so placed that they are available for tapping. Fig. 7 was drawn from a bark section of one of the best yielding trees that ever came to the writer's attention. This particular tree produced nearly 70 pounds of dry rubber in one year. Hence, with other factors in consideration, it was an extremely good tree from which to take buds. The circular bodies shown in the illustrations are groups of stone cells which constantly occur in Hevea bark, interrupting the regular arrangement of the rows of latex vessels.

Having determined the dry rubber content of the latex of these trees as well as the average daily volume, they are subjected to a minute examination for the presence of diseases or insect pests. Root diseases and white ants often increase the yield of latex temporarily. Other particulars of these selected trees are recorded,—the rate of growth, thickness and type of cortex, tapping system, age, soil, situation, nationality of tapper, in fact, all of the factors that could possibly affect the yield. With all of this information at hand it is possible to select the best trees for a supply of bud stock. The proper selection of the bud stock is naturally the most important factor in bud grafting.

Seedling Nurseries

As a rule, especially prepared seedling nurseries are necessary to facilitate the actual budding. The nurseries are laid out in good average soil. The planting should be 2 by 2 feet. A space of 3 or 4 feet wide should be left between each 6 rows for ease in working, carrying bud stock, supplies, etc. The seeds should be selected from healthy old trees, preferably from high yielders, although the influence of the root stock on the resulting grafted plant is considered small, providing it shows vigorous healthy growth. The seedlings in the nursery are ready for budding when they have attained 9 months' growth. The work is easier on large seedlings, say 18 months.

Budding Methods

The best time for budding is shortly after the wintering period and up to the period of the steady heavy rains. The work is best done early in the day before the sun gets too high. The bud stock is cut from the smaller branches of the selected trees. The branches are cut into convenient lengths for handling in the nurseries. A branch 6 feet long would furnish about 20 buds.

There are several budding methods which are in practice. Among them are the Forkert, inverted T, and patch methods,

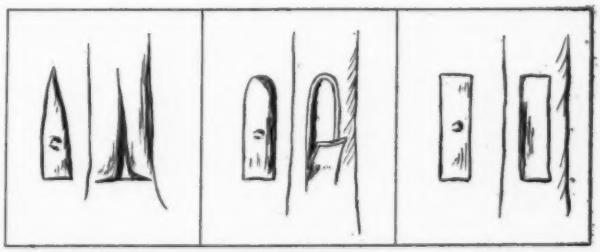

Fig. 8 Three Practical Methods for Bud-Grafting

shown in Fig. 8. The patch method has given the best results. It consists chiefly in removing an oblong of bark from the seedling, ¼-inch wide by 2 inches long, as close to the ground as is possible. The bud shield is removed from the branch and fitted, not too snugly, into the spots already cut from the seedling. It is held in place firmly by a strip of cotton cloth which has been previously dipped in a paraffin-rosin mixture. This cloth is wound around the patch tightly, forming a watertight protective cover.

Two weeks are allowed for the bud-graft "to take," then the cloth is removed and the bud shield is scratched with a knife to see whether the union of the stock and scion has taken place. If the cut shows green the graft is successful. A failure is easily recognized by the black and brown color of the patch tissue; however, a failure on one side of the stock does not prevent a second attempt on the opposite side.

After the bud has been grafted on successfully, it remains in a dormant state like any other bud until it is forced to develop. This is accomplished by cutting off the stem several inches above the bud (See Fig. 9). The "topped" plants are pulled from the nursery, the roots are trimmed slightly and are then ready to be transplanted in the field. The cut ends are dipped into wax mixture to prevent drying back when planted out. After being planted out it is essential that the seedlings be inspected regularly to see that only the grafted bud is developing; often other buds on the stem start first and have to be pruned off. A well-trained Malay can graft from 300 to 400 buds per day, without sacrificing care for speed. Bud material will not withstand transportation for a long distance and should be cut only when wanted for immediate use.

Future Possibilities

At present there is a comparatively small area of bud-grafted plants under cultivation. Most of the development has been in the Netherlands East Indies. There are, however, a few estates in Malaya that have taken this phase of rubber planting seriously. The future of bud grafting presents great possibilities. If we can increase the yield per acre from 300 pounds to 1,500 pounds per year the cost of production will decrease in proportion. These possibilities exist, however, for newly planted areas and not for those already in bearing.

Fig. 9. Bud Sprout Two Months Old

Rubber Restriction and American Planting

Statement from B. G. Work—Government Rubber Survey Plan—Some Planting Possibilities

President Work on Restriction

B. G. WORK, president of The B. F. Goodrich Co., Akron, Ohio, who recently returned from Europe, has issued a statement on rubber restriction which is in part as follows:

During my absence much has been said in the American and English press regarding rubber restriction and the possibilities of the United States producing its own rubber that has been misleading, and I believe that those interested in the subject will be glad to hear the actual facts.

While in London I had a conference with Sir James Stevenson, Commercial Advisor to the Foreign Office and sponsor of what he calls "the regulation plan," which undertakes to control the volume of rubber exports from the British colonies, but does not attempt to control the amount of production or planted areas.

The areas now planted in the English and Dutch colonies aggregate about 3,333,000 acres. It is interesting to imagine the world today without this source of supply which under normal conditions would produce roughly 400,000 tons annually. This enormous industry was built up with private capital and is no more a government monopoly than are our southern cotton plantations or our grain fields.

A rubber tree must be five years old before it is tapped, and eight years old before a return may be expected on the investment. During this period interest must be charged up as a part of the investment. Tropical enterprises are precarious and only tempting when large returns seem probable.

At the time of the rubber boom plantations were making enormous profits, which encouraged further investment and increased planting, so that more rubber than the world could absorb was produced. This condition was made still worse by the decreased consumption in the United States during the depression of 1920 and 1921.

A large surplus accumulated and the price fell far below cost of production. The situation was critical and something had to be done. Hence the Stevenson plan of regulating exports until the world demand could absorb existing surplus stocks and overtake present production facilities.

The actual cost of producing rubber is the keynote to the whole situation, and while the following figures, that deal with average and not special cases, vary with some that have been published they may be taken as authentic.

The average cost of clearing, planting, and growing an acre of rubber trees to maturity, including interest while the investment is idle, is $360. A liberal average yield for mature trees is 400 pounds of rubber per acre per annum. It is reasonable to anticipate 15 per cent as a fair return; therefore the fixed charge before operation works out at 13½ cents per pound of rubber to be produced.

15 per cent per annum on $360.00 (investment per acre).. equals	$54.00
400 pounds (yield per acre) at 13½ cents per pound..... equals	54.00

This 13½ cents is an underlying expense to be charged against every pound of rubber after the trees come into bearing and is independent of the cost of operation, which includes managers, superintendents, foremen, upkeep, depreciation, boxing, shipping, etc. It is known as "all-in" cost, and at present averages 9*d* or 17½ cents per pound. This cost added to the underlying carrying charge brings out a necessary selling price of 31 cents per pound to return 15 per cent on the investment. I wish to emphasize the fact that these costs represent the average of the total planted acreage and are high compared with the costs of well managed, favorably located estates.

The statements made regarding export taxes have been very misleading, as will be realized from the following facts:

The British Home Government imposes no tax of any kind on rubber.

The British Colonial Governments always have charged an export tax which amounts to about 1½ cents per pound at present. It is intended to cover actual expenses of supervising and encouraging the industry.

The tax is paid by the exporter and not by the buyer. Under the restriction plan a plantation is allowed to export only a fixed percentage of its standard production at the above minimum export tax. If it desires to exceed this quota it must pay a very

much higher, or practically prohibitive export tax. These excess taxes provided for are intended only as an automatic check to prevent surplus exportation.

Any plan to artificially regulate the price of a commodity will sooner or later run its course but this particular one is temporarily serving a good purpose for growers and manufacturers alike. In the meantime the relations existing between growers and manufacturers are the same as it has been and always will be—sellers and buyers—the sellers asking all they can get and the buyers paying as little as possible. No good buyer, however, desires to purchase his supplies at less than cost and thus ruin his own market.

The United States needs the rubber grown in the English and Dutch colonies and will continue to need it in increasing quantities. It can afford to pay a fair price and thus stimulate further planting to take care of future requirements. With regard to the United States growing its own rubber, Secretary Hoover is to be complimented upon his broad-minded view in recommending an exhaustive survey of the situation and it is sincerely hoped that something tangible may result.

In conclusion, just a word about Sir James Stevenson. He is acting gratuitously in an advisory capacity. He has no connection with the Rubber Growers' Association and no personal interest in rubber. I take the liberty of quoting his thought that a prevailing market price for rubber too much above or too much below its economic value would be disastrous for growers and manufacturers alike.

Rubber Survey Plans

The following is an outline of what one of the government experts predicts for the rubber survey:

An exhaustive survey of Mexico, Central America and tropical South America, to determine their possibilities for growing rubber on an extensive commercial scale to be started actively by the United States Department of Commerce in about three months. The nucleus of a staff of experts has been formed and useful data is being accumulated. A general report may not, however, be available before the end of 1923.

It is the intention to canvass the situation from every angle and to visit every field which holds forth any reasonable hope. The experts will inspect the Castilloa districts in Mexico and then ascertain how the planting of *Hevea brasiliensis* fared on many large estates which have been abandoned or been used for raising other crops.

Government officials prefer that the bulk of the $500,000 appropriation for research on growing rubber, jute, etc., should be expended in the Philippines and under the American flag. Leaders of the rubber industry fear that in the event of war there would be traffic interference with commodities grown in the American possessions in the Far East. Some believe that the four-power Pacific treaty would not insure against interruption in America's line of communications across the Pacific. At any rate, leading rubber men feel that rubber cultivation has not been given a fair trial in Mexico, and they are confident that rubber could be grown in the southern part of the country.

Even the provisions of Article 27 of the Mexican constitution, which, it is claimed, makes the tenure of land by others than Nationals very uncertain, do not dismay those who would invest in Mexican rubber plantations. They are confident that holdings would not be confiscated and that depredations by marauding revolutionists are very unlikely.

A long story could be told of the attempts at rubber cultivation in Mexico years ago. In some instances the growers cultivated a considerable amount of native Castilloa, as they were very skeptical about success with Hevea from Brazil. They figured that the soil and climate would be better suited to an indigenous tree like the Castilloa than the imported Hevea. The country, however, soon fell into a turbulent state and the promising ventures were almost wholly abandoned. With the prospect of more peaceful times, it is likely that scientific cultivation of Castilloa will, however, be recommended by the government experts, and that Hevea also will be given a very thorough tryout under conditions comparable with the best obtaining in Malaya.

Brazil

The Brazilian Ambassador at Washington, D. C., has issued a statement that follows, in part:

The Brazilian Government has followed with great interest the proposed plan for creating a new source of rubber supply for the American industry.

The Brazilian Government has ascertained what the governments of Pará and Amazonas, states which compose the Amazon region, were able to do in connection with this subject. It appears that a direct contact would give a more practical result, and the Brazilian embassy in Washington is ready to give to the American manufacturers all the necessary information and data. In case a special commission of experts is sent to investigate rubber conditions in the producing countries, the Brazilian Government will assist the commission in every possible way.

It is already possible to declare that the Government of the State of Pará offers, with the guarantee of the Federal Government, to allow American manufacturers to exploit plantations in the public lands of the state. To facilitate this, the state government is ready to modify the taxes which affect the rubber and even to abolish the exportation tax, should there be a just compensation.

Ecuador

The Secretary of the Legation of Ecuador writes as follows:

Ecuador's proximity to the United States and the excellence of her tropical lands for the production of rubber (*Hevea brasiliensis*) make her most worthy of the study of the government and rubber manufacturers of the United States.

Among other Provinces of Ecuador, Esmeraldas, which is only 2,491 nautical miles from New York via the Panama Canal, possesses tracts of land suited for the cultivation of rubber, according to Wilson Popenoe, an expert of the Department of Agriculture of the United States, who visited those territories and examined them carefully. Ecuador has also extensive territories in her oriental region which forms part of the Amazon valley; but for systematically cultivating rubber the Provinces of Esmeraldas, Guayas, Los Rios, and El Oro are more suitable because they are on the coast and are about four thousand miles nearer New York than the ports of the Amazon.

Colombia

Colombia possesses immense territories said to be suitable for the cultivation of rubber on a large scale. The practical steps taken recently by the Department of Commerce of the United States to find the various regions in the Latin American countries where new rubber plantations could be profitably located, have met with the most enthusiastic interest both from the Department of Agriculture of Colombia and from the private concerns already engaged in the growing of rubber trees on a commercial scale.

A great part of the Colombian territories where new rubber plantations could be started, or where the ones already in existence could be enlarged and improved, offers the additional advantage of being very close to the United States. The principal large rubber-growing centers of Colombia are the following:

The Atrato and Magdalena river valleys, the southern Pacific Coast region, the Vaupes, Orinoco, Rio Negro, Caqueta and Putumayo river valleys.

DEPARTMENT OF COMMERCE NOT PREDICTING RUBBER SURPLUS

The Department of Commerce corrects a statement recently made in connection with the crude rubber supply. The figures as issued by the department and based on statistics on consumption prepared by the Rubber Association of America estimated 430,000 tons of rubber available this year, including 82,000 tons held as stock in London, the London stocks being considered a part of the supply necessary for normal business. These statistics represented only an attempt to estimate the amount of rubber available, exclusive of stocks in hands of manufacturers and producers. While the article seemingly indicated a surplus of rubber for 1923, those responsible for the item reiterate that they are attempting to make no predictions whatever with regard to rubber.

RUBBER SECTION PROPOSES SAFETY CODE

The development of standard safety practice for all the important stages of rubber manufacture is being advanced by the Rubber Section of the National Safety Council. The first report of the Engineering Committee, as prepared by C. B. Mitchella, of The B. F. Goodrich Co., presented tentative drafts of safety codes for vulcanizers and for mills, washers and calenders. In view of the value of Mr. Mitchella's report it was decided by the Committee that a full list of relative subjects should also be covered, each subject to be assigned to some well-known authority in the rubber engineering world.

Water Dispersions from Rubber, Balata and Gutta Percha III

By John B. Tuttle[1]

IN the previous article upon this subject[2] it was stated that the status of the patents did not permit the entire disclosure of the Pratt Process by which crude or unvulcanized rubber was dispersed in water. At that time (December, 1922) it was anticipated that this side of the problem would be taken up in the March issue of THE INDIA RUBBER WORLD, but the unfortunate illness of Mr. Pratt caused some delay in the preparation of this article.

In discussing this phase of the question it is obvious that the matter can be treated in only a very general way. The substances used in preparing dispersions of rubber in water can be varied widely, and so it is advisable in describing the process to adhere to a single formula and follow this through the entire process. Furthermore, in order to make the matter clear to everyone, the process will be described as it may be carried out on a small scale in the laboratory, so as to enable the reader to reproduce for himself the results described.

Dispersion of Crude Rubber

The rubber (which may be smoked sheet, pale crêpe, fine Pará, synthetic, etc.) is broken down on an ordinary mill. Sufficient broken down rubber is dissolved in benzol to make a fairly thick cement. The percentage of rubber in this cement may vary widely, but we shall use one containing about 20 per cent of rubber. To this is added oleic acid to the extent of 5 per cent by weight[3] of the amount of rubber. Of this mixture take 500 cc. and place it in a beaker which has been equipped with a mechanical stirring device.

After the stirring has been started add slowly a dilute solution of ammonium hydroxide. At first the solution thickens, with the water in the form of the dispersed and the cement as the continuous phase. A further quantity of ammonia water is added and the stirring continued until we come to a break where the situation is reversed, the benzol-rubber solution splitting up into small globules, and the water uniting to form the continuous phase. A slight excess of ammonia water is added.

At this state of the process we have a finely dispersed rubber solution which can be diluted without coagulation. However, it contains most of the benzol originally present in the cement (on a small scale there may be a slight loss through evaporation). This is removed in one of two ways: On a laboratory scale where recovery is of no importance, the simplest procedure is to continue with the stirring, heating slightly, and applying a current of air across the top of the solution, continuing this until all of the benzol is removed; on a larger scale, the benzol is driven off in a closed system and recovered for future use.

In the above procedure we have apparently coated each particle of rubber with a protective coating which prevents coagulation. Undoubtedly this is exactly the condition in which we find the rubber in natural latex. The addition of acetic acid will bring about coagulation just as in the natural latex. Chemical examination of the coagulated rubber shows that it contains practically the same acetone extract and protein as were found in the rubber originally used.

After the removal of the benzol the dispersed rubber solution contains an excess of ammonium oleate. This is removed mechanically so that the final dispersion shall consist only of dispersed crude rubber, water and a trace of soap—by analysis found to be less than that existing in the preserved latex as it is received in the American market. The removal of the soap in solution in the water concentrates the dispersion to a thick paste containing from 50 to 60 per cent of rubber, the balance being water. This paste, like the benzol dispersion at first obtained, can also be diluted with water without causing coagulation. Sometimes it is desirable to dilute with water containing a small quantity of ammonium hydroxide.

Natural latex has only recently been shipped to consumers in this country in any appreciable commercial quantities, hence it is probably rather early to judge as to what uses may be developed for it; but it must be perfectly obvious that just as long as we have rubber only, as we have in the natural latex, we are always facing the difficulty in getting this rubber vulcanized. Even assuming that natural latex (or dispersed rubber, if the latter be found by the rubber manufacturers to be equally suitable for the purpose) is found to have many and varied applications, there still remains the question of what we are to do in those cases where it cannot be used. The principal difficulty lies in getting a uniform cure with the dried rubber from latex, or a rubber dispersion. At present the best and practically the only practice is to get sulphur in the rubber from adjacent stocks by diffusion during vulcanization. The question arises as to how sufficient sulphur and other vulcanizing materials can be introduced into the rubber so as to get uniform and correct cures. Even while the first work in dispersing rubber was under way this problem received consideration and led to the decision to carry the dispersion process to its logical conclusion in order to see what could be done to make it applicable for any purpose to which the rubber manufacturer may care to put it.

A study of the process described above will show that we have been dealing with crude rubber which is dispersed without removal of any of the non-rubber constituents known to be in crude rubber. We are thus dealing with a complex mixture rather than with a simple substance. We may, therefore, look upon the dispersion in one of two ways: (a) the non-rubber substances are dissolved in, or intimately attached to or connected with the rubber hydrocarbon, and are dispersed in the same globule; (b) the non-rubber substances are separate from the rubber hydrocarbon, and are separately and simultaneously dispersed during the process. If the latter is the case, as seems quite likely, then we have in our first operation succeeded in dispersing a number of organic substances to make a stable milk or what some people have called "synthetic latex."

It will be noted that we have already explained in a previous article that this term is not correctly descriptive of the product, since it is prepared from rubber which does not contain all of the substances present in the natural latex.

It may be in order to point out here that the proposition of making synthetic latex which would closely resemble the natural is fairly simple after one has dispersed coagulated rubber. One

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[1]Consulting chemist, 68 Bank street, New York, N. Y.

[2]THE INDIA RUBBER WORLD, January 1, 1923, 213-5.

[3]The amount of oleic acid is placed at 5 per cent in this illustration of the process because it has been observed that the securing of the reaction of phase reversal is made easier by increasing the percentage of the saponifiable substance. With greater familiarity with the reaction, one can secure equally good results with a much lower percentage than 5 per cent. The principal objections to the use of any larger amount than absolutely necessary are the increase in cost of securing the dispersion, and the increased quantity of soap which must be eliminated later on.

need add only the serum substances which are missing, or use similar sugars, albumens, etc., to get a very fair duplication of the natural latex. It is this knowledge that a synthetic latex can be prepared which makes it desirable to avoid ambiguity in our nomenclature by giving some distinctive and appropriate name, such as "dispersed rubber," to the product prepared from coagulated rubber.

Sulphur

The first substance which anyone would naturally desire to include in a dispersed rubber solution is sulphur. A water dispersion of sulphur was prepared in exactly the same manner as that described above for rubber. The two dispersions were mixed and tested in two ways: (a) The mixture was coagulated in the usual way with acetic acid, the rubber and sulphur dried, and vulcanized in slab form. The cure obtained was comparable with that obtained from the same mixture of crude rubber and sulphur. (b) A mixture of dispersions was applied to fabric, and the latter dried and vulcanized. The same rate of vulcanization was obtained in this way as in the case of rubber and sulphur applied to fabric by frictioning. Of course, these mixed dispersions, or the sulphur dispersions, could be added to natural latex, if one desired to do it. The rubber-sulphur compound contained 90 per cent rubber and 10 per cent sulphur. The progression of the cure was judged by the appearance and adhesion of the stock. It was not considered necessary to make very exact comparisons such as would be obtained by determining the coefficient of vulcanization. Such a refinement we would hold for later use.

Accelerators

The next natural step in extending the process would be to add an accelerator. Aniline oil was dispersed as described under rubber and mixed with similar dispersions of sulphur and rubber. This mixture was coagulated, dried, and vulcanized to a satisfactory product. Other accelerations, such as ethylidene aniline, were dispersed in the same manner.

Pigments

In order to introduce pigments into a mixture of dispersions the simplest procedure would be to stir into the mixture whatever pigments it is desired to use. Zinc oxide was tried in this way and the product coagulated, dried, and vulcanized. The results were very satisfactory. Additional experiments were made by applying the mixed dispersion containing zinc oxide to various types of fabric. The latter was dried, vulcanized, and a cure obtained which compared very favorably with the cure obtained by using the same compound and applying it on a calender.

Dispersions of Compounds

From just these few experiments it is obvious that the principal constituents of a rubber friction compound could be separately dispersed. The same materials can be dispersed when a rubber compound containing them is dissolved in benzol to form a rubber cement. One of the types dispersed as a compound contained 60 per cent smoked sheet, 28 per cent amber crêpe, 2 per cent rolled brown crêpe, 6 per cent sulphur, 3 per cent of zinc oxide, and 1 per cent of aniline oil. A great many other mixtures have been dispersed, but it is unnecessary at this time to go into details of their composition.

I would like to emphasize at this point something which has been mentioned above, and that is, in describing the various dispersions of rubber, sulphur, accelerators, compounds, etc., we have given but one illustration. Dispersions can be obtained equally as well with other dispersing materials, alkalies, etc., and the proportions of the different substances used may vary over a wide scale. Moreover, the process is not dependent upon the shape or size of the stirrer, the manner of stirring, or speed. Temperature affects the dispersion, but it is not necessary to maintain a very constant temperature. Most dispersions have been made at room temperature; others have been heated to 70 degrees C. It should be noted that increased temperature at times facilitates the dispersion, while with some compounds it retards it.

The point is just this: the conditions under which the dispersed rubber compound is used differ so greatly from present practice that this process offers possibilities which did not exist formerly. However, in considering these advantages we must also acknowledge the necessity for studying conditions and finding those under which we obtain the best results in any particular case. This is exactly what we do today with all of our new rubber formulas; we do not take one set of conditions and expect them to apply to all cases.

There is still another angle to the problem, and that is, in compounding stocks for producing rubber dispersions, we do not need to add soft tacky rubbers, oils, M. R., etc., which are necessary when a stock is to be used on a calender. If the compounder so desires he can use in his friction stocks nothing but the hardest and best wild or plantation rubbers. Thus he has an even wider field for exercising his judgment in the preparation of stocks for definite purposes.[4]

Commercial Application

In the commercial application of the process the rubber compound would be mixed as usual and made into a cement in any of the churns or cement mixers which a rubber manufacturer may happen to possess. The cement is then transferred to a kettle provided with a stirring device, for we may, by suitably equipping the churn, work directly in the latter. The ammonia water solution is added, and after the dispersion has been obtained, and without necessarily removing the dispersion from the kettle, or churn, the benzol is distilled off and recovered. The rapidity with which the dispersion can be obtained, the efficient and complete removal of the solvent and its recovery, and the concentration of the dispersion so as to insure satisfactory control for factory practice—these are all matters which have been investigated and quite naturally are being prepared for commercial exploitation. They really have nothing whatever to do with the process itself but only with that phase of the problem which involves the securing of the desired results so far as possible with practically nothing but the equipment which any fairly modern factory would possess. It is more a question of reducing to the lowest possible point the cost of securing the dispersion, so as to facilitate the adoption of the process in manufacturing, than a matter of the chemistry or physics of the reaction.

Tests

Although space forbids going very far into this part of the problem, it is desirable to give some indication of the nature of the product obtained. One example will suffice. The compound used was as follows: 55 per cent smoked sheet, 29 per cent amber crêpe, 2 per cent rolled brown crêpe, 9 per cent sulphur, 3 per cent zinc oxide, 2 per cent whiting, and 1 per cent ethylidene aniline. The dispersed rubber was applied to the fabric by spreading. The stock so prepared was built up into four plies and vulcanized at 45 pounds steam pressure for 60 minutes. A check test was made with the same stock, using a laboratory calender. The dispersed rubber gave an adhesion test of 25 pounds average for six tests (two samples), and the calendered fabric gave 24 pounds in three tests (one sample). All three samples were cured at the same time, and in the same press.

Summary

We have described a process which gives a picture of the general method for producing rubber dispersions. It is admittedly rather sketchy and leaves untouched the many variations

[4]In the earlier publications on the subject, we stated that as yet no attempt had been made to prepare dispersions of reclaimed rubber. It may be of interest to state here that since that time both acid and alkali reclaims have been successfully dispersed.

of the process which have been employed. Tests on the products obtained have been and are being made, but for the present the results will be withheld until their number is such that we can feel justified in assuming that the influence of the variations which occur in all manufacturing and testing will be largely eliminated, and thus we shall know just what are the properties of the various dispersions which we obtain.

It is axiomatic that the applicability of a process depends not only upon the fact that it can be done, and upon the quality of the product obtained, but also on whether or not these results can be secured at a competitive cost.

In cases such as this one, it is desirable first to work out the engineering problems involved in the mechanical handling of large stocks such as would be used in commercial practice in any particular application of the dispersion. This is being done in the present instance through the development (a) of methods by which the present equipment of rubber factories will suffice for the purpose; (b) of new and special equipment, having in mind the economy of operation and the uniformity of production so necessary in reducing to a minimum the possibility of losses through mistakes when the process may be operated by inefficient or untrained labor (in a word, make it "fool-proof.")

If it be desirable to say in a few words just what advantages this process would seem to give to rubber manufacturers one might point out, among other possibilities, the replacing of expensive calenders by spreading machines, the elimination of losses which accompany the use of volatile solvents, decrease in fire hazard, etc.

Interesting Letters From Our Readers

Rubberizing Cotton Electrically

TO THE EDITOR:

DEAR SIR: The impregnation of cotton by the Hopkinson latex-immersion process is certainly a valuable and practical improvement on the familiar modes of solutioning, spreading, skimming, and frictioning in the rubberizing of fabric, yet it would seem possible to make even a closer approximation to optimum textile saturation. In addition to thorough steeping, as in the Hopkinson process, and in which rubber particles appear to be perfectly deposited on and within fabric, perhaps the impregnation might be carried further, so as not only to coat the fabric and fill the interstices but actually to carry the caoutchouc into the very lumen or cavity of the hollow, helical, ribbon-like cotton fibers.

The microscope has revealed rubber thus in some of the fibers of fabric treated by the Hopkinson process; yet it may be that the rubber entered the lumen by chance, as through broken fiber, rather than osmotic pressure, normal or accelerated. May not such penetration and deposition be made more uniform, complete, and unvarying, as is accomplished, for instance, by the Tate process, in which cotton fabrics are waterproofed electrolytically (and yet left ventilated) by not only coating them with a basic oleate of aluminum but actually depositing ions of aluminum in the innermost part of the fabric? If textiles could be thus rubberized there would be little to fear in the way of competition with electro-chemically treated fabrics.

In the Tate process highly-ionized metallic salts are carried into the very heart of animal (wool) and vegetable (cotton) fibers by means of an electric current of low alternation. It would seem to be worth while to experiment with rubber latex along similar lines. The complete dispersion of a crystalloid or a metallic salt through fiber electrically has been demonstrated. May not a colloid substance, such as pure rubber, be also diffused thoroughly in fiber if made an electrolyte and activated by a high-potential, high-frequency current with 100,000, 500,000, or more alternations per second, as yielded by the Tesla and other apparatus?

In the phenomenon of cataphoresis similar currents of much lower frequency readily disperse such substances as terpene oil through living animal tissue. A small amount of the oil placed on a part of the body quite distant from the tongue is, through such electrical conduction, quickly perceived by the sense of taste, as is also true of many ethereal oils. Terpene has a formula similar to that long given to rubber (C_{10} H_{16}), and is practically a polymer of isoprene (C_5 H_8). Even conceding the wide variance in electrical conductivity of inert fabric and living tissue, it may be possible to bridge such a gap, as many a one has been spanned before by indefatigable experimenters, especially if in rubber impregnation they employ a current that transcends the resistance of cotton, glass, air, and other dielectrics.

W. C. CAMPBELL.

[The suggestion of impregnating fabric by a process akin to cataphoresis or electric osmos is interesting. Even were its feasibility determined, the chances are that it would be long befor the process would pass from the laboratory stage to that of commercial production. Electricity in some forms has already been employed in rubber experiments. Ten years ago Ernest Hopkinson, inventor of the new latex-spraying process, using an electric current, obtained caoutchouc from latex, only to find that he had been anticipated, the process being a subject of patents in Ceylon and India. In some of the early work on the impregnation of yarns and fibers, Mr. Hopkinson and Dr. Gibbons tried electrolytic depositing of rubber but finally discarded it as unimportant and unnecessary, inasmuch as simple immersion for a sufficient period appeared to afford every practical advantage desired. Yet this is not said to discourage further research and experimenting along these lines.—THE EDITOR.]

A Suggested Compromise

TO THE EDITOR:

DEAR SIR: The courageous and soothing remarks, attributed to William O'Neil, general manager of the General Tire & Rubber Co., in a New York newspaper, which indicates that there was "much ado about nothing" in reference to the "rubber hysteria," prompt me to suggest a compromise between the alleged deadlock between Winston Churchill of London and Harvey S. Firestone of Akron. Mr. Churchill implies there is nothing to compel the British to produce rubber at a loss, and Mr. Firestone is quoted as saying that he will stir up an international protest over the Stevenson plan.

Having refreshed my memory in rubber history from the files of THE INDIA RUBBER WORLD, I found the average price for the past 25 years was about 90 cents per pound (for Upriver Fine or plantation, whichever had the greater tonnage). Let us assume that the cost of producing Upriver Fine is just twice that of Ribbed Smoked Sheet, or First Latex Crêpe. Then a fair average price for a compromise would be one half of 90 cents, or 45 cents per pound, say, for a five-year period in the future.

Let us reflect awhile on ten-dollar rubber, if the Brazilians had caught H. A. Wickham smuggling his supply of seeds from the region of the Tapajos River. How would an export duty of $2.30 per pound look to the American manufacturers to-day?

QUINCY TUCKER.

Boston, Massachusetts, March 21, 1923.

An Outline of British Proofing Methods[1]

Cloth Treatment—Raw Materials—Compounding and Milling Stocks—The Spreading Process—Curing and Finishing—Peachey Process Tests

By M. M. Heywood

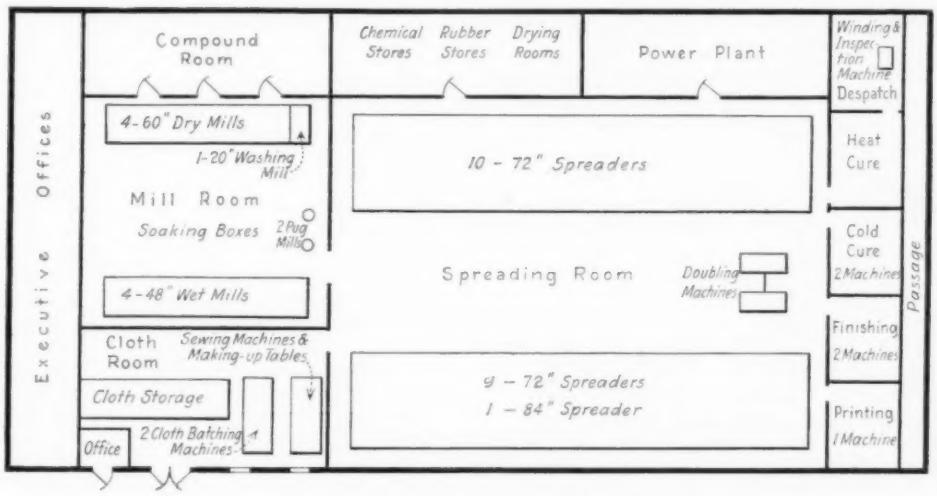
FROM the English point of view America takes a back seat when it comes to proofing. The business is done on a very close margin and its secrets are closely guarded. Not only are no visitors admitted to the works, but expert proofers are not employed by firms without the consent of the former employer.

For convenience in following the operations in a modern English proofing factory, the accompanying diagrams will be useful.

Cloth is received from the manufacturers, garment makers, or dyers in lumps or pieces, with a reference number to the order of which the piece is part. Attached to the cloth is also a ticket giving length, width, shade, quality, the maker's or sender's name, and the order number. The cloth is stacked in a dry room, known as the cloth room, so that the ticket is easily readable.

When a length of cloth is to be spread, instructions are issued to the cloth-room foreman to inspect, weigh, and measure some particular piece or pieces which, except the weighing, is done on a cloth lapping machine consisting essentially of a table, a measuring device, and two headstocks holding the detachable bar on which is placed the batch roller. Any faults, such as narrow width, short length, knots, dropped ends, and dyeing variations, are reported to the cloth-room office, which records them. The cloth-room staff takes care that the nap side of the cloth is next the batch roller, and with double texture goods, when two different cloths and linings are on the same roller, they see that the linings are in the same rotation as the face cloths.

The job is then sent to the makers-up who attach the leaders to the cloth, and each piece of cloth to the succeeding piece, either by stitching or pasting with flour paste. Then the job, with a spreading check issued by the cloth office giving the spreading instructions, is sent to the spreading room. This spreading check goes from department to department with the goods.



Plan of a British Proofing Plant

Raw Materials

Plantation grades of rubber are generally compounded with certain of the tacky wild rubbers. Brown and speckled crêpe is used in the body and some first coating compounds, the lighter colored rubbers being used in the brighter colored mixings. The sticky wild rubbers are used in the first coating compound to make the compound adhere to the fabric.

The usual mineral fillers and colors are used, special care being taken as to fineness. Brown substitute is of value, as this ingredient is a mixing aid, facilitates spreading, and is also a preservative. White substitute is used for surface compounds which are cold cured by the Parkes method. Coal tar naptha is used as the general solvent, though some factories use the Scotch shale spirit which has advantages under some conditions.

Compounding

It is general custom to guarantee proofed cloth for two years, and bearing this in mind the aim is low gravity and cheapness, although non-guaranteed proofings, such as cart cloths, heavy tan ducks, and some motorhood cloths, are proofed with heavy compounds. Lime, magnesium compounds, and litharge are the chief accelerators used, the latter being a constituent of all heat cured batches. Sulphur is kept at a minimum.

Standard surface batches are preferred as basic batches for the various colored surfaces, as such mixings may be tinted on the wet mill to the shade required. Below are typical compounds.

First Coat Compound	Per Cent
Speckled crêpe	8.00
Guayule	8.25
Pontianak	8.25
Brown substitute	16.00
White substitute	16.00
Litharge	10.00
Sulphur	0.50
Vegetable black	5.00
Zinc oxide	25.00
Ordinary yellow	4.00
Ordinary green	4.00
Naphtha ..... gals.	12.00

The colors used in this mixing are mineral ochres.

Body Compound	No. 1 Per Cent	No. 2 Per Cent	No. 3 Per Cent
Brown crêpe	11.000	4.0	4.5
Pontianak	3.500	Nil	2.0
Brown substitute	35.000	12.0	13.0
Litharge	15.000	7.0	8.0
Sulphur	0.375	0.5	0.5
Vegetable, black	13.125	5.0	9.0
Whiting	13.500	17.0	9.0
Shoe reclaim	Nil	9.0	10.5
Barytes	Nil	44.5	42.5
Naphtha ..... gals.	12	23.5	22.0

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VARNISH FOR DOUBLE TEXTURE GOODS	Per cent
Light crêpe	62.5
Sulphur	3.5
Litharge	10.0
Speckled crêpe	24.0
Naphtha ..... Gal.	16

COLD CURE SURFACE. OLIVE	Per cent
Light crêpe	8.0
Pontianak	1.0
White substitute	12.5
Zinc oxide	47.0
Ordinary yellow	20.0
Special yellow	8.5
Ordinary green	2.0
Naphtha ..... Gal.	10

The special yellow is a lead or zinc chromate.

The above compounds are for medium class proofings and good enough for the quality guarantee.

Mixing and Wet Milling

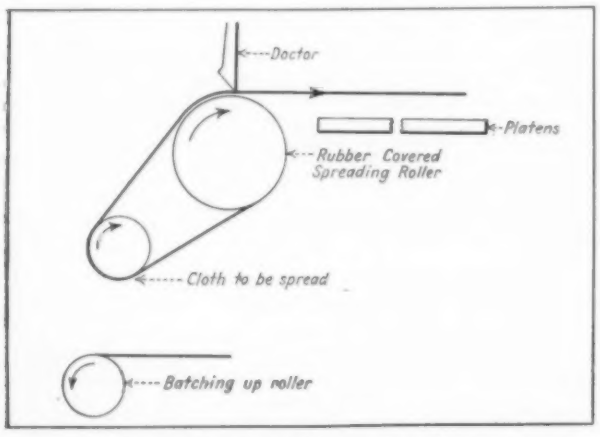
Mixing follows the general procedure adopted by rubber manufacturers, and when completed the batch is cut from the rolls and while hot is placed with the necessary amount of solvent in a dough box where the mix is intermittently stirred during the soaking period. After soaking for about twenty-four hours the batch is ready for wet milling.

The wet mill is very similar in construction to the dry mill, with the addition of scrapers to each roll. The speed is also faster. The partly prepared dough is placed on the mill with the scrapers raised; the dough sticking to both rolls is constantly scraped from and returned to the rolls. This lifting and lowering of the scrapers is continued until the dough is of the right consistency for spreading, when it is placed in a can and sent to the spreading department.

Spreading

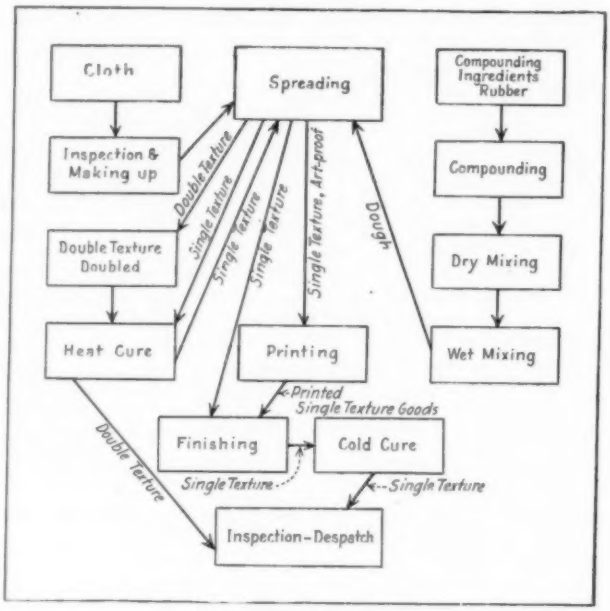
Spreading machines are common to most rubber factories and in general have a variable speed from 2 to 8 yards per minute; the platen length is from 12 to 20 feet, the working pressure being from 10 to 15 pounds per square inch. The spreading procedure is as follows:

On the receipt of the cloth from the cloth room the machine operator reads the instructions on the spreading check and orders the amount of each dough required, the dough being drawn from stock. If the check specifies a dry weight the batch-roller cloth and leaders are weighed and the weight entered on the check. This weighing is unnecessary if a wet weight is specified, the weight of the dough used being taken. In the meanwhile the cloth is prepared for spreading, in the following manner.



Operating Principle of a Spreader

The roll of fabric is placed on an iron bar supported in the top bracket of the spreader, the leading cloth threaded around the rubber-covered spreading roll, around the batch roll of fabric, and between the cloth covering the spreading roll and the spreading knife or doctor, and then over the platens around the back drum and under the machine to the batching up roller. On



Progress Diagram

receipt of the first-coating dough, the operator commences the work by lowering the doctor until it is nearly in contact with the cloth. The distance being accurately set, the dough is placed up to the doctor and the machine set in motion on the slowest speed.

It is observed that for the first few yards the cloth presents a pie-bald appearance, which is due to the unevenness of the surface of the dough. This is remedied by stopping the machine, removing the dough, raising the doctor, and rewinding the amount of cloth run. The doctor is then reset, the dough replaced and the machine set in motion again, when it will be seen that the dough spreads correctly; then the first coating is run on.

The cloth and leaders are run around the machine to the batching-up bracket, the empty batch box is removed from the machine, the full one is also removed and turned over from left to right and placed in the top bracket, the empty batch roll being placed in the winding-up bracket. This is termed reversing the cloth, the idea being to counteract the combing action of the doctor on the cloth by enabling the next coat to be run from the opposite end on to the previous coat.

The speed of the machine is now increased to four yards per minute and the body coats are applied, after the last of which the cloth is tested for water proofness. If intended for double texture garments a coat of varnish is given and the cloth is doubled to the lining on a doubling machine and then sent to the heat curing room; single texture goods are sent to this department after the last body coat. The system of heat curing the body and cold curing the surface of single texture goods is known as the "double cure" process and is superior to the single cold cure method.

Heat Curing

The heat curing chamber is built of heat insulating material with doors at each end, in which are inspection windows, the dimensions of the chamber being 12 feet high by 10 feet wide, and long enough to take 1,000 yards of fabric.

Attached to the roof of the chamber is an iron trolley that supports the cloth trolley on which the cloth is hung in festoons some eight inches apart. Dampers allow the fumes to escape at the end of the cure and help in the regulation of the temperatures, and the usual heat recorders are used.

A temperature of 240 degrees F. is maintained by steam pipes.

The time for vulcanization of the mixings for single texture goods is 1 hour at 240 degrees F.; for double textures 1½ hours at this temperature, with 20 minutes rise in each instance. After curing, double texture goods are sent to the despatch department, single texture goods being returned to the spreading room, where the surface coats are applied and the cloth tested for proofness after the second surface coat.

If the cloth is to be art proof, after the final coat it is sent to the printing room, where a pattern is printed on with a dyed rubber solution, in a machine very similar to a calico printing machine.

Finishing

The rubbered surface is powdered with starch in the following manner: The cloth is led under a wooden doctor in the powder box containing the starch and between brushes which remove the excess chalk from both sides of the fabric, the brushing being continued until the desired effect is obtained.

Cold Curing

The last factory operation is the vulcanization of the surface rubber with a three per cent solution of sulphur chloride in carbon-disulphide.

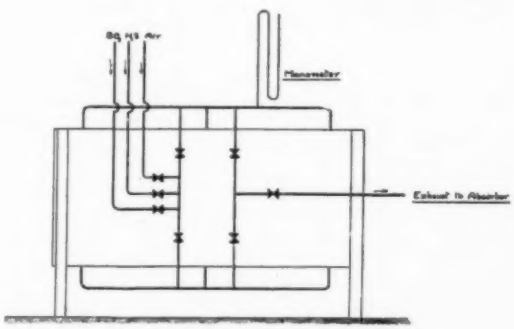
The curing machine consists of a roller which revolves in the trough containing the curing solution, and a heated drum to drive off the excess curing mixture. The machine is enclosed by wooden partitions in which are doors to allow the fabric to be placed in position and removed at the end of the operation. Exhaust fans remove the fumes.

The cloth is run with the rubbered side in contact with the partly immersed roller, which carries the curing solution to the rubber, and passes over the heated drum to the batching-up roller. The speed of the cloth is 20 feet per minute.

The cloth is again run over a heated drum, to remove the last traces of the curing mixture, and very good fabrics such as silk are exposed to ammonia vapor and sent to the despatch room.

Despatch

In this department the cloth is measured, inspected, and wound on a pole in a machine similar to the lapping machine. Before



Peachey Vulcanizer Pipe Connections

delivery a sample is cut from the piece, to which is attached a label, a similar one being stuck on the end of the pole.

The full particulars concerning the cloth are entered on the spreading check and sent, with the spreading check, to the laboratory for filing. The weight ordered is compared with the weight used and any variation above the limit error allowed is noted and reported to the spreading-room foreman, who informs the machine hand concerned.

Laboratory

No mention has been made of the part played by the chemist, who controls the technical side of the plant. Specifications are not given for the mineral fillers as the tests do not vary from the usual ones given to rubber compounding ingredients, though perhaps the degree of fineness is greater.

Special proofing grades of substitutes that are made should be used with an eye to the acetone extract, which should not be over 20 per cent in dark substitute and 10 per cent in white substitute. Coal tar naphtha with a distillation test of 90 per cent at 160 degrees C. should be free from napthalene, pyridine, and globules of water; the specific gravity range is from 0.86 to 0.89.

Cloth should be free from sizing materials and oils; the dye not affected by small amounts of hydrochloric acid, or ammonia fumes; the mordants free from any salt injurious to rubber; a one per cent aqueous solution of sulphur dioxide should not bleach the dye; on spotting with a one per cent solution of ferric chloride, allowing to dry for a few hours, and washing out, there should be no staining of the fabric. When the cloth is immersed in boiling water for two minutes the resulting extract should not stain a filter paper to an appreciable extent. Proofed cloth should stand a heat test of 650 hours at 52 degrees C. without tendering.

Costings

The cost of the compound is arrived at in the usual manner and to this figure is added the cost of the solvent per 100 pounds dry compound. Wet mixing charges are now added, which run about ½*d* per pound of dough and include overhead, labor, and evaporation. This gives the cost of the dough to the spreading room.

The spreading labor charges are calculated on a unit length of 100 yards, on the basis of 5 coats for single textures and 7 coats for double textures, the running time of the machine for the job being taken. This plus the cost of dough and spreading-room overhead gives the spreading costs. Each subsequent operation is taken on a labor and material basis plus departmental overhead.

Over a number of years it has been found that the "all-in" cost of proofing a fabric may be taken on the basis of cost of dough used plus 3*d* halfpenny per yard, on a plant running 20 machines, each machine doing 3,000 yards per week of 54 hours. On this basis the cost of proofing the fabrics on spreading check No. 1 would be 6*d* and check No. 2 9*d* per running yard.

Proofing Plant Layout

A typical plant layout is shown on the title page, and such a factory could be staffed as follows: Works manager, mill-room foreman, cloth-room foreman, spreading-room foreman, chemist, engineer.

Labor as follows: Cloth-room office, 1 man and 1 boy; cloth room proper, 4 men and 3 boys. This includes the despatch department staff. Compound room, 2 men and 1 boy; wet and dry mill room, 10 men and 3 boys; spreading room, 25 men and 10 boys; printing room, 1 man and 1 boy; finishing and cold cure rooms, 4 men; heat cure room, 2 men.

The Peachey Process

In conclusion reference will be made to the Peachey process, which may be satisfactorily used in curing fabrics proofed with pure rubber and compounds free from basic materials. Single texture goods proofed to 4 ounces per square yard can be vulcanized in ½ hour. The following are the details of tests made

by the author on fabric that requires very careful treatment.

Silk crêpe de chine of a pale rose color, was proofed to the above weight with a 33 per cent pure rubber dough in benzene as the solvent. After the last coat the surface was finished with starch, and the cloth hung in festoons in a rectangular aluminum curing chamber.

The first treatment with sulphur dioxide was for 7 minutes, when the gas was displaced by air, which also removes the surface gas from the cloth. Hydrogen sulphide was then run into the chamber, this treatment lasting twenty minutes, when the gas was displaced with air and the goods removed. The gas is used at atmospheric pressure. A slight odor of the last gas remains on the fabric for a couple of hours but exposure to air will remove this, the final product being quite odorless.

This process holds a marked advantage over the Parkes cure or the Goodyear cure for fine fabrics as the cloth and the dyestuff are not damaged at all. Fabrics may be cured by this method which could not be vulcanized by any other method, producing an entirely new range of goods especially attractive for ladies' wear.

Pouring and Casting India Rubber

Details of the Jones Process for Pouring Rubber Solutions into Molds, Securing Perfect Castings That Are Cured During the Process Without the Application of Heat

THE average citizen believes that all molded rubber goods are made by melting rubber, pouring, and casting. Nor is it possible to teach him differently. It is therefore interesting to note that the Jones process of cold molding, in part at least, makes that belief tenable.

While the rubber is not melted it is put into liquid form, poured, and cast, and the popular conception is met at least half way.

The process is based upon the discovery by Peachey of a method of cold vulcanization[1] by means of hydrogen sulphide and sulphur dioxide gases. From it comes a method previously unheard of until its fascinating practical possibilities as a method of cold molding soft rubber articles appealed to the imagination of Fordyce Jones of London, who has devised means to reduce the conception to a commercial use and embodied his development in a series of British patent applications.[2]

Primary Hydrogen Sulphide Solution

Briefly, the manufacturing procedure is as follows:

A ten per cent solution of rubber in benzine is made in a rubber churn or cement mixer. The solution is strained, allowed to settle, and then passed through an aluminum diffuser exposing it to an atmosphere of hydrogen sulphide. The rubber readily absorbs the gas to saturation and may be drawn off at will for immediate use or storage. If this gas-saturated solution of rubber is kept in tightly closed vessels it will remain good indefinitely. Perfect gels have been made from solution prepared 18 months previously. This keeping quality is of great value in practical working of the process.

Sulphur Dioxide Solution

A second solution or curing reagent is made by passing sulphur dioxide gas into benzine until a given quantity has been absorbed. A dye can be added to this solution if required. When stoppered or stocked in sealed containers this solution will remain good for any time.

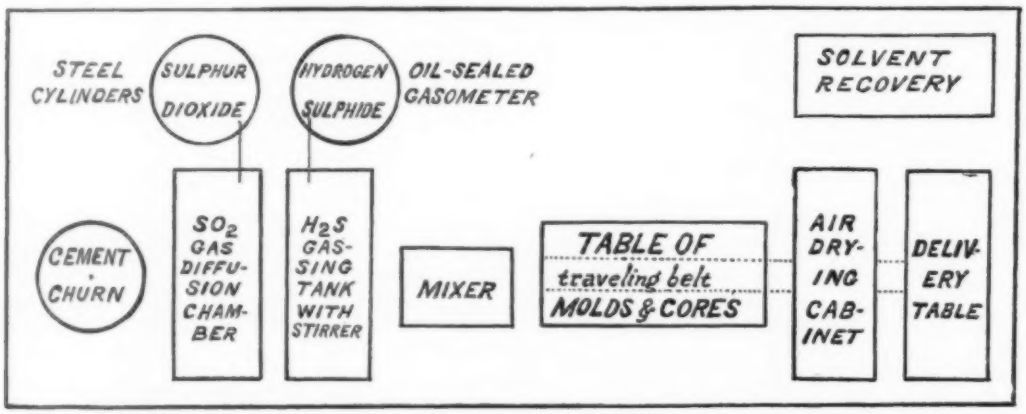


Fig. 1 Plan of a Rubber Molding Plant

Forming the Gel and Curing

The operation of this method of molding rubber articles is a special application of the Peachey process in which rubber, holding absorbed hydrogen sulphide, is cured by exposure to sulphur dioxide, these active gases mutually reacting to liberate active free sulphur within the rubber mass, which combines readily with the rubber in vulcanization. In the prepared solutions no question of waste gases arises. The gases are used without loss, and as only 1.4 pounds of each gas is required to vulcanize 100 pounds of raw rubber, their cost is practically negligible.

[1] British Patent No. 129,826.

[2] British Patents No. 17,935. July 1, 1921. Process for Manufacture of Rubber Articles; No. 21,842. August 17, 1921. Process for Molding Rubber Articles; No. 24,912. September 20, 1921. Dough Molding Machine; No. 24,619. November 7, 1921. Molding Rubber Articles; No. 7,247. March 11, 1922. Process for Treatment of Rubber; No. 10,304. April 11, 1922. Preparation of Rubber; No. 11,717. April 26, 1922. Process for Treatment of Rubber.

When the above described solutions are mixed a gel soon forms with contraction of the mass. Both accelerators and restrainers have been discovered and are utilized for regulating the gelling period so that it will take place in from three to five minutes, up to a half hour or longer if necessary. To shape the rubber gel into formed articles the solutions are first pumped together into aluminum mixers and rapidly mingled in about 20 revolutions of the stirrer. A slide valve is then drawn and the solution flows into an aluminum mold which has a much larger cavity than the size of the finished article to allow for gel sufficient to make up for shrinkage. The molds are provided with interchangeable cores to facilitate the work of molding.

Factory Plan and Operations

A convenient arrangement of the manufacturing plant for molding by this method is shown in Fig. 1. The rubber solution is prepared by dissolving crude rubber in an ordinary cement churn. It is next transferred to the hydrogen sulphide gassing tank where absorption of the gas is assisted by a stirring arrangement. The supply of hydrogen sulphide is drawn from an oil-sealed gasometer. The sulphur dioxide gas is stored in steel cylinders and connection is made to a diffusion chamber for effecting its solution in benzine. An aluminum tank arranged for stirring and heating is employed for combining the two solutions ready for pouring the gellifying mixture.

The molding operation is simple. The assembled molds and cores on the molding table are poured full of the vulcanizing solution and allowed to stand a sufficient length of time for a stiff gel to form. The molding table is long and is provided with a central belt for passing the molds beyond the filling point for a sufficient period to permit the full gelling action. The molds are then opened by hand, the core removed with the gel adhering, and carried into a long, heated drying cabinet on a travelling carriage which passes through the cabinet on rails.

Sufficient time is allowed to elapse for thorough drying, depending on the thickness of the article. The cores are then removed, preferably at the end of the cabinet farthest from the entrance, and the cured finished product is ready for attachment of fittings and for packing.

As all the solvent is evaporated in the cabinet, the highly saturated warm air is easily removed for recovery in a special piece of apparatus conveniently located.

Typical Cold Mold

In Fig. 2 a vertical section of a typical mold employed in the process is shown. In this instance the object is a hollow teat or nipple. The mingled warm solution from the mixer is poured into the mold A in which the core B has been previously centrally located. The mold may be formed with a contracted neck by means of a ring D sliding on the core and having passages E, or the mold may be constructed wholly or in part of flexible material.

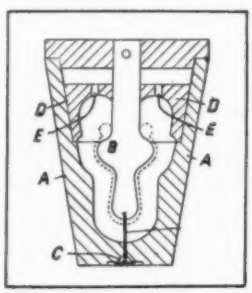


Fig. 2. Rubber Solution Mold

Features of the Process

Production of cold molded goods by the method described is quite different from either hot-cured or dipped goods by the usual methods. The new process is essentially chemical and in spite of many seeming difficulties is very simple in operation. The only critical point is that of measuring correct quantities of sulphur dioxide and saturated hydrogen sulphide solutions, but this is very easily controlled and tests can be made with great accuracy at any required moment.

The entire process is extremely simple and easily controlled. There is no danger of over or under curing or of blooming unless this is especially desired. Any compounding ingredients can be added to the rubber solution. The addition of lithopone or like fillers gives a clean white rubber of great purity of color. Samples have been made containing 40 per cent of lithopone slightly blued to overcome the natural yellow tint of the rubber, from which articles have been produced of supreme whiteness otherwise unattainable. For surgical rubber goods and many fancy lines this will prove a great attraction. It will be appreciated that colored opaque goods can be produced by the addition of suitable fillers and dyes.

Surface Effects

Some very attractive surface effects are possible by additions and manipulations. A satinette surface is easily obtained. This can be made to permeate the whole structure or appear as a deep seated surface effect only. It is not a purely external and temporary result like that obtained by chloride of sulphur and cornstarch but is a very lasting one. With the addition of aniline dyes many beautiful colors can be obtained, producing goods of great attraction and increased selling value. This novel process promises a great future for the production of surgical goods, bathing caps, druggists sundries, and fancy rubber articles, also for the manufacture of continuous lengths of transparent or colored tubing for surgical and chemical purposes.

The Product

The great feature of this cure lies in the fact that vulcanization takes place throughout the entire mass of the product at the same time; therefore the cure is neither a surface one nor incomplete, occurring under variable degrees of heat. It is truly chemical and permeates the entire structure of the rubber, curing every molecule of it. The splendid physical properties and apparently perfect polymerization are attributable to the fact that the product is a combination of colloidal rubber and colloidal sulphur. The texture of the product can be altered in any desired degree. A cure with a low coefficient of sulphur yields a texture of silky softness which is quite new in manufactured rubber. The product can also be cured up tough, containing a higher percentage of sulphur which instead of hardening the rubber to vulcanite simply increases its tensile strength. An excessive cure breaks the rubber down and destroys it.

TIRES OF LARGER SECTION IN VIEW

Experimental work now in progress by leading tire manufacturers is directed toward the development of passenger car tires large in section and thin in wall. Under equal load conditions these tires can be operated with much lower inflation pressure than tires of smaller section and heavy walls, thus greatly increasing the ease of riding and eliminating jolting.

This new type of casing is made possible by the use of a 20-inch instead of the usual 23-inch wheel rim. It is quite possible that the present 33 by 5-inch eight-ply cord tire with recommended inflation of 70 pounds pressure will be superseded by the new type tire of 32 by 6-inch six-ply, to be inflated with 40 pounds pressure, or perhaps by 34 by 7-inch, four-ply, at 25 to 30 pounds. These super tires are not appreciably heavier than the type now in use and should not be confused with the new line of pneumatic track tires, where the 20-inch rim has also been adopted. The track tires have many plies in the wall and operate at pressures up to 100 pounds per square inch.

The new type passenger car casings have no effect upon the driving characteristics of the car and show improved braking effects and much better non-skid and traction qualities. The views of the technical experts of the leading tire manufacturers and of automobile engineers coincide that the new development will rapidly become standardized because of its apparent advantages.

Meeting of the Rubber Division American Chemical Society

THE sixty-fifth meeting of the American Chemical Society was held at Yale University, New Haven, Connecticut, April 2 to 9, 1923. The Rubber Division meetings took place on April 5 and 6, and the attendance was about 150, representing every branch of the rubber industry.

The Rubber Division was honored by the presence of Professor Giuseppi Bruni of the Polytechnic of Milan, Italy, to whom a very cordial welcome was extended as he presented his most interesting paper. At the closing session a vote of thanks was given to Professor Bruni in appreciation of his paper and the honor of his visit. To this expression of good feeling Professor Bruni made graceful acknowledgement.

Abstracts of the Committee reports and of the papers read are given below.

Committee Reports

The Executive Committee made no report.

The Trade Name Accelerator Committee reported the addition of a few new accelerators to the present list and proposed to prepare for the information of the divisional membership a revised list of trade name accelerators with their corresponding chemical names.

The Committee on Originator of Organic Accelerators made no report pending outcome of litigation on accelerators now in progress.

The Committees on Physical Testing, on Standardization of Test Formulas, and on Analytical Methods were discharged. The report of the latter committee was accepted as recently printed.[1] This report contains certain additions agreed upon at a joint meeting held with Sub-Committee XI of D-11, American Society for Testing Materials, which Sub-Committee has recommended that this report be adopted as tentative standard procedure for the American Society for Testing Materials.

In place of the three discharged committees two new committees were appointed which are practically a reconstruction of the discontinued committees. In order to facilitate their work, geographical location as well as professional eminence was considered in the selection of the membership of the new committees and to each was attached a consulting group regardless of residence. The membership of the new committees is as follows:

Physical Testing Committee

W. W. Vogt, Chairman, Goodyear Tire & Rubber Co.
J. W. Slade, The B. F. Goodrich Rubber Co.
Ira Williams, Firestone Tire & Rubber Co.

Corresponding Members

E. B. Curtis, United States Rubber Co.
C. W. Sanderson, The Fisk Rubber Co.

Sub-committee on Apparatus

T. G. Co[illegible]m, United States Rubber Co.
D. C. Scott, Henry L. Scott & Co.

Crude Rubber Testing Committee

D. F. Cranor, Chairman, Lee Tire & Rubber Co.
E. A. Van Valkenburg, Ajax Tire & Rubber Co.
M. P. Rose, United States Rubber Co.
C. W. Sanderson, The Fisk Rubber Co.

Corresponding Members

Doctor Giuseppi Bruni, Società Italiana Pirelli.
H. A. Hoffman, The B. F. Goodrich Co.
G. S. Whitney, McGill University.
R. P. Dinsmore, Goodyear Tire & Rubber Co.
G. Stavely, Firestone Tire & Rubber Co.

The division voted unanimously to accept the rule of the society requiring abstracts of papers to be sent one month in advance to the secretary. This will allow sufficient time to get abstracts into the hands of members as preparation for more active discussion of the papers as read.

Abstracts of Papers

Solubility of Sulphur in Rubber. The authors' researches on this subject are a most important contribution to the chemistry of rubber and may lead to the explanation of what vulcanization is. —W. J. Kelly and K. B. Ayers.

Review of Recent Important Investigations in the Chemistry of Rubber. The more important recent investigations on the chemistry of rubber show the following results obtained:

(1) Substantiation of the C_5H_8 ratio and the C_5H_8 nucleus as the fundamental grouping in the rubber hydrocarbon, and the presence of a double bond for each C_5H_8 nucleus. (2) Hydrogenation of rubber directly and in solution has been accomplished. (3) Studies in oxidation have produced new products, especially $(C_5H_8O)_x$. (4) Viscosity measurements have shown that the change during the heating of a solution of rubber is reversible, provided air is excluded. (5) Action of concentrated sulphuric acid on a rubber solution produces what appears to be an isomerized rubber.—H. L. Fisher.

Time Versus Temperature of Vulcanization. In conjunction with two other laboratories and the advice of about thirty consultants, about thirty compounds containing different accelerators with varying amounts of sulphur and activators have been cured over a considerable range of time at each of three fixed temperatures, also over a range of temperatures in accordance with what under certain conditions might be the actual thermal condition in certain parts of a tire during vulcanization, thereby establishing some relation between rates of vulcanization under different thermal conditions.—A. A. Somerville.

The Use of Selenium in Rubber Compounding. Although selenium alone will produce but a very poor vulcanization in rubber, mixtures of sulphur and selenium may be used with good results. The addition of 0.2 per cent of selenium greatly increases the tensile strength. Such stocks are highly colored and vary from light yellow through bright red to dark brown. Selenium when used with sulphur produces much faster vulcanization with apparently little or no combination of selenium. The crystallization of sulphur in rubber is affected by the presence of selenium.—Ira Williams.

A Method of Measuring Cure By Compression Tests. Description of an apparatus attachable to a Scott testing machine by means of which a one-inch cube cut from a solid mass of rubber may be compressed. Data for per cent compression, energy and hysteresis are shown in relation to the time-tensile curves.—R. J. Bonstein.

Reactions of Accelerators During Vulcanization. VI.—Action of Litharge and Organic Acids. L. E. Weber has shown that an acetone extracted rubber will not vulcanize in a mix containing litharge. The same is true of the vulcanization by nitro com-

[1] Industrial and Engineering Chemistry, March, 1923, 308-313.

pounds and litharge without sulphur. In either case organic acids or phenols will replace the natural resins and vulcanization will result. Acetone extracts of plantation rubbers react with metallic oxides at ordinary temperatures, forming metallic salts soluble in benzene and rubber. Solution of the metallic radical in rubber is one prerequisite for the action of inorganic accelerators.—C. W. Bedford and H. A. Winkelmann.

Poisson's Ratio and Related Properties for Compounded Rubber. Discussion of permanent set and comparison of the influence of isotropic and anisotropic compounding ingredients.—W. W. Vogt and R. D. Evans.

Examination of the Emulsifying Properties of Some Constituents of Hevea Latex. The acetone extract of pale crêpe contains the emulsifying agents of caoutchouc in latex. These consist of semi-solids, Heveic acids, and liquid acids. Of these the semi-solids are the main emulsifying agent. Fresh latex will reject the addition of powders and will not impregnate fibers, while ammoniated latex will do so, because of the action of ammonia on the liquid acids present forming soaps.—G. S. Whitby and J. Dolid.

Relations Between the Chemical Character of Liquids and Their Ability to Swell or Disperse Rubber. Qualitative observations only have been made disclosing that there are several classes of organic substances, such as bases and fatty acids, which will dissolve rubber by swelling and dispersion.—G. S. Whitby.

Note on the Pyrrole Test As Applied to Rubber. The author points out the fact that the pyrrole test is not conclusive as to the presence of levulinic aldehyde in tacky rubber. The reaction is obtainable with the protein in samples of all rubber. Also their water extracts will react if heated alone or with zinc dust, due to the presence of soluble salts formed in the serum salts.—G. S. Whitby.

Studies of Vulcanization Accelerators. I. Experiments with Piperidonium Piperidyl Dithiocarbamate. II. Experiments with Various Organic Compounds. I. In the presence of the organic accelerator named 1A zinc oxide, when present to amount of five volumes, the cure advances by 50 per cent over the effect of ordinary zinc oxide. The reverse is true when the zinc oxide amounts to 20 volumes. Presumably this is because the 1A oxide needs increased mass of sulphur for its reaction. II. The action of accelerators depends on the presence of the sulphydro group which forms metallic mercaptides. The zinc, lead and cadmium salts of piperidyl dithiocarbamate are very stable compounds having melting points respectively of 219, 234, and 243 degrees C. Not all such metallic derivatives of the sulphydro group have accelerative power.—G. S. Whitby and H. E. Simmons.

L. S. Rubber, A New Crude Rubber.[1] The method of producing latex sprayed (L. S.) rubber; its physical and technical properties were described.—E. Hopkinson.

Laboratory Burning Test for Accelerators. A simple apparatus was described for rapid determination of the cure-burn ratio of burning on the mixing rolls of high powered accelerators. Test formula is rubber, 100; zinc oxide, 10; sulphur, 3, made into a cement with benzole. The accelerator to be tested is added to the cement sufficient to cure the compound to 3,000 pounds tensile per square inch in 60 minutes. A glass rod is dipped into the test cement containing accelerator and is heated in an atmosphere of carbon dioxide heated to known temperature in a bottle surrounded with an oil bath. Cure of the fiber on the rod indicates the burning ratio by comparison with a standard. The method is adapted to composition of any formula. —S. M. Cadwell and O. H. Smith.

Substitution and Addition of Chlorine in the Rubber Molecule. Chlorine reacting with caoutchouc gives a heptachloride of caoutchouc. There is both substitution and addition of chlorine in the formation of the compound.—J. McGarvack.

[1] THE INDIA RUBBER WORLD, January 1, 1923, 207.

Organic Acceleration of Vulcanization. This paper had a wider scope than the title indicates. The absorption of oxygen in progressive cures of a 100 to 8 rubber sulphur mixing was given and shown to be about the same in actual amounts but the rate of absorption quite different. The rate of absorption of the oxygen is the critical factor and not the amount absorbed. The ratio between the absorbed oxygen and the rubber to reduce the time of vulcanization to one tenth normal is one atom of oxygen to 25 molecules of rubber.

A laboratory instrument was described for measuring the plasticity at given temperatures for different rubber mixings, the results being shown in a graph plotted weight against time. This plasticity test is a measure of the scorching power of any accelerator.

In artificial latices water is the disperse phase when rubber in benzine is shaken in plain water, but rubber is the disperse phase when its benzine solution is shaken in soapy water.

The work of Marzetti on the tearing resistance of rubber was discussed. Tearability is influenced by width, thickness, and flexibility of the test piece, also by the speed of applying the load. The correct speed for smooth separation must be determined to secure proper tests.

Influence of room temperature on the stress-strain curve is such that tests should be standardized at normal temperatures. Cure is judged by the stress-strain ratio taken at 200, 300, and 500 per cent elongations respectively, for mechanical, tire tread, and pure gum inner tube stocks.

Nitrogen disulphide, N_4S_4, vulcanizes rubber without addition of sulphur.

The author agrees, in the main, with Bedford and Whitby that disulphides are vulcanizers, not accelerators. He maintains that vulcanization is a chemical change, not a physical one.—Giuseppi Bruni.

Rubber Chemists Dinner

About 175 members and guests enjoyed the dinner held in commemoration of Charles Goodyear at the Lawn Club in the evening of April 5.

The dinner program was printed in booklet form bearing on its cover a reproduction of the Naugatuck portrait bust of Goodyear. A few words of welcome to the first dinner of the Rubber Division were wittily phrased and followed by the menu designated as Compound No. 1 in terms of rubber, sulphur, accelerators, and compounding ingredients with gravity, pound cost, and cure. The progress of the dinner was enlivened by the interspersion of original verses sung by the assembly to familiar tunes, the topical song of rubber and compounding ingredients being one of the best.

Following the dinner came an entertainment in the form of spiritualistic materializations by "Medium Pará" (Mrs. Ellwood B. Spear), who summoned successively the spirits, each arrayed in the costume of his day and country, of Charles Goodyear, Thomas Hancock, Jan Van Geun, discoverers of vulcanization; Thomas Rowley, discoverer of acceleration of vulcanizing by ammonia derivatives; and Christopher Columbus, discoverer of caoutchouc as well as of America.

Charles Goodyear

The spirit of Charles Goodyear, impersonated by Ellwood B. Spear, was the first to materialize. Standing by a mounted cord tire he spoke of his wonderful invention and the remarkable development of the important industry to which it gave rise, then followed with an outline of his life work accomplished under the most adverse conditions of poverty to the point of starvation for his family, and debtors' prison for himself. Repeatedly encouraged and disappointed in his experimenting, Goodyear, in 1838, bought a patent from Nathaniel Hayward of Woburn, Massachusetts, who had found that if sulphur was rubbed over the rubber and the latter allowed to stand in the sun the surface was much improved and did not become sticky. Goods made after this process were a

failure and led to experiments with heat before the kitchen fire. Finally a fortunate accident occurred. The sulphur-containing rubber sample became scorched, as Goodyear first thought; in reality, as he soon convinced himself, the "change" he had so long futilely sought for was at last accomplished. Vulcanization was discovered at last.

Thomas Hancock

The spirit of Thomas Hancock was next impersonated, by Prof. G. S. Whitby, who soliloquized on the origin of the rubber industry in England, based on his invention of a machine for massing together pieces of crude rubber by mastication. He and his partner, Charles Macintosh, began the manufacture of weather-proofed double texture coats in 1820. The germs of many modern developments in the technology of rubber were present in their work.

The most stirring event of Hancock's career was his discovery of changing the properties of rubber by what was later named, by Brockenden, vulcanization. Hancock acknowledged priority of discovery of hot vulcanization with sulphur by Goodyear, samples of whose cured rubber he had seen. By means of ice he investigated the effect of cold on rubber in seeking to produce the sought-for "change." At last, on heating some strips of rubber in molten sulphur at 240 degrees F. the result revealed to him "the true source of producing the 'change' in all its states and conditions and in all its pure and pristine simplicity."

Even during Hancock's life a physical and a chemical theory had joined issue, of which the end is not yet. A physical theory was advanced in 1852 by Prof. Brande, who suggested that vulcanization brought about a change of the caoutchouc to an allotropic form.

Jan Van Geun

Among the early rubber experimenters and manufacturers was Jan Van Geun of Haarlem, Netherlands. Impersonated by Winfield Scott he referred to his factory book of receipts and costs to prove that as early as 1828 he produced rubber goods serviceable alike in winter or summer weather. He utilized a method published by Lüdersdorff in 1832 for dissolving rubber and preparing turpentine oil with sulphur. Van Geun united two-ply sail duck with such cooked mixtures and made the double texture into fire hose. It has since been shown that his products contained 4¼ per cent of combined sulphur.

Thomas Rowley

Impersonated by C. W. Bedford, the chemist, Thomas Rowley, appealed for justice and spoke of his English patent of 1881 on the vulcanization obtainable from ammonia in any form. This discovery is at the base of most of the modern accelerators, except xanthates and other non-nitrogenous accelerators.

Christopher Columbus

Impersonated by C. Olin North, Christopher Columbus told of his paramount discovery of rubber and made a plea for American-grown rubber and release from the price control of foreign plantation monopoly. The Brazilian rubber monopoly was broken by Wickham, who first developed cultivated rubber, and by the deresinated rubber from guayule and pontianak. Again the impossible must be done and another rubber monopoly be broken.

Following the speeches the dinner party dispersed, after voting unanimously to send the following telegram to Mrs. Nelson Goodyear, New York, N. Y., as a token of respect to her grandfather, Charles Goodyear:

"At this the memorial banquet of the Rubber Division of the American Chemical Society we are gathered to honor the life and work of that great genius, your grandfather, Charles Goodyear, inventor of the vulcanization of rubber. Pray accept at this time our felicitations and best wishes."

(Signed) For Rubber Division,
W. B. WIEGAND, *Chairman.*

Bruni's Lecture on Rubber Chemistry

Prof. Giuseppi Bruni in a lecture, "Theoretical and Practical Rubber Chemistry," delivered at Columbia University, April 9, 1923, referred to German rubber chemistry as theoretical and to American rubber chemistry as practical.

He credited the work of Harries on the synthesis of rubber from isoprene as fundamental. Harries made methyl butadene, a sort of rubber which has not the physical properties of caoutchouc. It is without practical importance because of the cheap and abundant production of plantation natural rubber.

Prof. Bruni dwelt at length on the work by Pummer and Standringer on the hydrogenation of rubber which has importance because of its bearing on the chemical constitution of caoutchouc. Hydrogenated rubber is different from caoutchouc, being very plastic, not elastic, and it does not vulcanize.

The total Hevea rubber trees comprised in all the plantations of the world are estimated at 500,000,000. The latex produced contains from 30 to 32 per cent of rubber containing resins and 1 to 1½ per cent of protein or nitrogenous bodies. The latex serum contains sugars, quebrachitol, and organic acids.

Use of latex direct is made in three ways: (1) for producing sprayed crude rubber, (2) in paper making, and (3) in direct impregnation of fabrics. The latter is by far the most important direct use as it has very important advantages over calendering and permits use of fibers of shorter staple.

Rubber acts like a solvent and dissolves the solvent rather than being dissolved by it. That rubber also dissolves sulphur to the extent of 100 per cent of its weight has been shown by the researches of W. J. Kelly. This fact has an important bearing in vulcanization.

Goodyear's discovery of vulcanization in 1839 was referred to as one of the greatest discoveries in the history of civilization. The normal temperature of vulcanization is 144 degrees C. and the normal time two hours for soft rubber. Brief reference was made to cold vulcanization of rubber by sulphur chloride, Parke's process; by sulphur dioxide and hydrogen sulphide, Peachey process; and without sulphur, Ostromislensky.

C. O. Weber was the first to attack the problem of the chemistry of vulcanization. The subject is being studied intensively by various research chemists. The most tenable theory seems to be that vulcanization is a chemical combination of caoutchouc with sulphur, one atom of sulphur combining with 40 or 50 molecules in the isoprene chain to produce vulcanization by polymerization, the isoprene chain condensing and taking on sulphur at the double bond. This is no stranger than the synthesis of solid caoutchouc by polymerization of the liquid isoprene.

The action of mineral accelerators, litharge and magnesia reduces the normal curing time of rubber-sulphur mixing to a half or a third the normal time. The first application of organic accelerators was made in the Goodrich factories in 1907 when aniline was employed. The chemists of the Bayer Company cured synthetic rubber by adding to it organic bodies capable of supplying the missing nitrogen by dissociation.

Nitrogen base ultra-accelerators act on the sulphur containing part of the molecule, forming a salt with zinc; for example, the xantogente of zinc. Dimethyl thiuram disulphide is not only an accelerator but can produce vulcanization by itself. The added sulphur unites with the zinc and the disulphide constitutes the real accelerator.

Organic accelerators not only hasten vulcanization at reduced temperatures but lessen the amount of sulphur required. Pure gum stocks without accelerators require for vulcanization five to eight per cent of sulphur, with accelerators only half to one per cent or even none at all. The presence of accelerators prevents blooming and aids the aging quality of rubber. Aging is due to oxidation. One per cent of absorbed oxygen reduces rubber to one tenth its value.

What the Rubber Chemists Are Doing

Persistence of Calender Grain After Vulcanization[1]

By W. B. Weigand and H. A. Braendle[2]

BRIEFLY abstracted this mathematical paper records experiments designated to reconcile, if possible, the conflicting evidence of workers such as Van Rossem and the Bureau of Standards, and to confirm in a quantitative way that many articles of vulcanized rubber, such as inner tubes, rubber footwear, solid tires, etc., give conclusive evidence of the persistence of "grain" after vulcanization.

On theoretical grounds it was conjectured that the grain effect might well be dual in origin, part being attributable to the rubber phase and part to any pigment phase present in the mixing. It was also thought that if vulcanization were carried out under controlled conditions it might be shown that the persistence of grain was a function of the degree of freedom of the sample during cure.

Compounds Tested

Five compounds in continuous use in works practice were selected.

No.	Compound	Constituents	Per Cent by Volume
1	Pure gum tube compound	Rubber	97
2	High grade zinc oxide tube compound	Rubber	92
		Zinc oxide	4
3	Red antimony tube compound	Rubber	9
		Antimony containing 40 per cent calcium sulphate	10
4	First grade shoe upper compound	Rubber	73
		Whiting	18
		Litharge	3
		Gas black	2.5
5	Shoe soling compound	Rubber	52
		Whiting	35
		Litharge	2
		Gas black	3

In all cases sheets were taken from regular factory runnings which had been calendered in such a way as to arrest crawl either by chilling over a bottom roll and cooling drums, or by winding into a fabric liner substantially in accordance with calendering schemes two and three as classified by Van Rossem.

Vulcanization of these samples was carried out under four conditions designated as follows:

MAXIMUM DISTORTION. Cure carried out in standard laboratory molds with exceptionally heavy overflow, as, for example, sheets plied up to 150 mils and molded down to 95 mils. This cure was designed to induce complete elimination of "grain."

MAXIMUM FREEDOM. Sheets were cured on carefully soapstoned tin plates in live steam. This cure was designed to permit free retraction, with a view to the elimination of that part of the "grain" effect attributable to the rubber phase.

IMPRISONED BY FABRIC. In the tube compounds this cure was carried out on regular tube mandrels with a straight jacket and cross wrapper under standard works conditions. In the shoe compounds samples were cured on a wooden pole covered with holland, the ends of the sample sheets being tied together by lap joints.

IMPRISONED IN MOLD CAVITY. Stock was cut to exact dimensions of the mold cavity, overflow being, therefore, extremely light, and in no case more than five mils on a sample originally 100 mils thick. This cure was designed to inhibit crawl, and so preserve the "grain" effect due both to the rubber phase and the pigment phase.

The samples were cured to standard technical optimum in each case dumb-bell test pieces cut with and across the grain and tested in a Scott machine at room temperature.

General Conclusions

The "grain" effect may persist after vulcanization over a wide range of compounds, *including pure gum.* In all cases the stress-strain curve with the "grain" is stiffer than across the "grain," thus confirming the data of the Bureau of Standards and others.

The magnitude of the "grain" effect after vulcanization can be artificially controlled by, and varies markedly according to, the curing conditions and also the compounds, the latter being the more influential.

The "grain" effect must be regarded as dual in origin—that due to the rubber phase and that due to the pigment phase. The former can be preserved or obliterated during vulcanization according as the sample is imprisoned or markedly distorted during the cure. The latter persists under all conditions although definitely influenced in a similar direction by the curing method.

In general and for all methods of cure, pigmentation increases the "grain" effect. This is particularly true of pigments showing acicular crystal habit.

Further study of "grain" phenomena after vulcanization would include a systematic variation of both the amount and degree of dispersion of the pigment phases in the compound. It would also seem that the search for the ideal rubber pigment should include a study of the "grain" effects after cure in terms of not only size but crystal habit of the particles.

The whole "grain" problem is replete with theoretical and practical significance.

[1] Presented before the Rubber Division at the meeting of the American Chemical Society, Pittsburgh, Pennsylvania, September 4 to 8, 1922.
[2] Ames Holden McCready, Ltd., Montreal, Canada.

Preservation and Packing of Latex for Shipment[1]

The most satisfactory preservative for rubber latex, as far as is known at present, is ammonia. Experiments are being carried out with other substances as a substitute for ammonia, since this chemical is somewhat dangerous to handle and is expensive especially at the present local price.

A number of substances can be used in lieu of ammonia, which are more satisfactory and economical, but it is not advisable to employ them without knowledge of the purposes for which the latex is to be used and its subsequent method of treatment. Thus, sodium hydroxide and carbonate can be used, while potassium cyanide in very small quantities is an excellent preservative but probably too dangerous. Preservatives such as boric acid are practically useless. Sodium phenate will probably prove excellent provided the free alkali is subsequently neutralized. Small quantities of the soluble fluorides of sodium, potassium or ammonium may also prove suitable and economical.

At present the use of ammonia is advocated and the following recommendations are made: Ammonia may be used (1) in the form of the strong solution known as liquor ammon fortis; (2) in the form of gas from cylinders of the compressed gas; (3) generated as a gas from salts of ammonia, in an apparatus on the estate.

Method of Application

The solution of ammonia should be added to the extent of two per cent on the volume of latex, 3¼ fluid ounces or 8 ounces by weight per gallon of latex. Compressed ammonia gas in steel cylinders can be substituted satisfactorily for the strong solution.

[1] B. J. Eaton in The Malayan Agricultural Journal, June 1922, Vol. X. No. 6.

The gas may be used by making a saturated solution by passing it into water. Since the addition of less than one per cent of the gas is required in latex, there would be no loss of gas and very little heat developed by passing the gas directly into the latex in large tanks.

Preparation of Ammonia on the Estate

Although the method of preparing ammonia gas on the estate has not yet been adopted in practice, probably the most economical method would be to import ammonium sulphate or chloride. The only other chemical required is lime, which is easily obtainable. By heating together slaked lime and ammonium sulphate or chloride, ammonia gas is generated. With a safety gage between the generator and latex container the gas can be passed directly into the latex.

Rubber Latex

In order to save freight on water, the latex should be collected "dry" and contain at least three pounds of dry rubber per gallon. It should be strained carefully and the ammonia added as soon as possible after the latex reaches the factory, in order to inhibit preliminary fermentation and formation of acid.

Latex preserved as described can be shipped (1) in kerosene tins carefully sealed by soldering, packing two tins in a wooden box or crate so that they fit tightly; (2) in steel drums, or (3) in tanks or tank steamers. If drums or tins contain traces of oil this can be removed by blowing steam into them.

Chemical Patents

The United States

PRESERVATIVE SUBSTANCES FOR RUBBER LATEX. Concentrated alkalized phenol preservative in the form of a powder containing a mixture of phenol crystal with caustic soda.—Samuel C. Davidson, deceased, late of Belfast, Ireland: by Frederick G. MaGuire, Bangor, Alfred Agar, Hollywood, and Hugh T. Coulter, Belfast, executors, all in Ireland. United States patent No. 1,447,930.

PROCESS OF TREATING RUBBER AND THE PRODUCT OBTAINED. The process comprises combining with the rubber as an accelerator, dipiperidyl-thiuram-sulphite and a vulcanizing agent, and vulcanizing the rubber.—Sidney M. Cadwell, Leonia, New Jersey, assignor to the Naugatuck Chemical Co., Naugatuck, Connecticut. United States patent No. 1,449,493.

The Dominion of Canada

RUBBER MIX. The process consists in mixing in rubber, water carrying in suspension hydroxide of aluminum, driving off the water, and heating the mix with a vulcanizing agent to effect vulcanization.—The Goodyear Tire & Rubber Co., assignee of Robert C. Hartong, both of Akron, Ohio. Canadian patent No. 228,871.

VULCANIZING PROCESS. Curing rubber by bringing together under reacting conditions sulphur and a methylene anilin to form a sulphur-nitrogen accelerator, incorporating this accelerator in the caoutchouc mix and vulcanizing.—The Goodyear Tire & Rubber Co., assignee of Clayton W. Bedford, both of Akron, Ohio. Canadian patent No. 228,873.

RUBBER VULCANIZATION. The process comprises combining rubber with a vulcanizing agent and diphenyl-dimethyl-thiuram-disulphide and vulcanizing the rubber.—The Canadian Consolidated Rubber Co., Limited, Montreal. Canadian patents No. 229,133.

The United Kingdom

INDIA RUBBER COMPOSITION. Solid products obtained by condensing acetylene with finely divided metals such as copper, their salts or alloys, or by submitting acetylene to dark electric discharge and known as "Cuprene," are employed as an ingredient in rubber compositions.—Elektriztatswerk Lona, Basil, Switzerland. British patent No. 192,080.

RUBBER SOLUTIONS. In rubber solutions to which a vulcanizing agent such as sulphur chloride is added, the vulcanizing agent is dissolved in a volatile non-inflammable medium. Two pounds of rubber are dissolved in six gallons of carbon tetrachloride or liquid acetylene chloride, and to this solution is added 10 cc. of sulphur chloride dissolved in 1,000 cc. of acetone and 1,200 cc. of amyl acetate.—S. R. Sheppard, 2 Bradiston Road, Maida Hill, London. British patent No. 192,163.

ATTACHING RUBBER TO LEATHER. Unvulcanized rubber is attached to leather or other material by coating one or both of the surfaces to be joined with a rubber solution such as is described above in British patent No. 192,163, and pressing the surfaces together.—S. R. Sheppard, 2 Bradiston Road, Maida Hill, London. British patent No. 192,164.

PUNCTURE SEALING COMPOSITION. A composition for injecting into inner tubes consists of asbestos powder and fiber, shorts or middlings, creolin, tannin, salicylic acid, ammonia, powdered cork, methylene blue, formaldehyde, sodium silicate solution, and carbonic acid to which is added water and denatured alcohol.—F. Jackson, Indianapolis, Indiana. British patent No. 192,213.

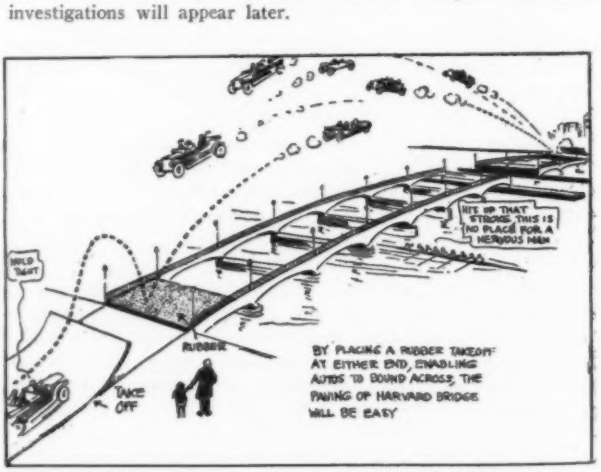
CARBONEX

Carbonex is a natural asphaltic product containing a minimum of forty per cent of naturally occurring free carbon of colloidal fineness. As a compounding ingredient Carbonex has the effect of greatly increasing the abrasive wear and eliminating bloom on cured goods.

THE USE OF CARBON DIOXIDE IN AIR BAGS

The article on the use of carbon dioxide in air bags, published in THE INDIA RUBBER WORLD, March 1, 1923, revealed to tire manufacturers generally the marked advantages of carbon dioxide in conserving the life of air bags. Many manufacturers are investigating the subject on a commercial scale with gratifying confirmatory results. One company has demonstrated 100 per cent increase of life in their air bags, which are of heavy gage and lightly compounded; each of the two other companies reports 50 per cent increase in durability of air bags. A new feature in connection with these practical studies is the strong indication that carbon dioxide definitely delays the destructive effect on the outside of the bag due to the migration of the sulphur.

Studies are now in progress on the use of carbon dioxide in drying smoked sheets and in the prevention of spreader fires, and also in the recovery of rubber solvents. Reports on these investigations will appear later.


HOLD THAT
RUBBER
TAKE OFF
BY PLACING A RUBBER TAKEOFF AT EITHER END, ENABLING AUTOS TO BOUND ACROSS, THE PAVING OF HARVARD BRIDGE WILL BE EASY

The Boston Globe

The Rubber Industry of Italy

Professor Bruni's Visit—His Personal Record—Pirelli the Pioneer Company—History and Development of the Industry

THE recent American visit of Professor Giuseppi Bruni, Italy's leading rubber chemist, included the dedication of the new Sterling Chemical Laboratories of Yale University, New Haven, Connecticut, to which ceremony he was expressly invited by Yale; the spring meeting of the Rubber Division of the American Chemical Society; lectures before Columbia University, Mellon Institute, and Ohio State University during a tour of the chief centers of rubber manufacturing, and conferences with many important rubber executives, chemists, and technologists.

Prof. G. Bruni

Professor Bruni first visited this country as a representative of the Italian Government to the international meeting of chemists held at New York City in 1912. His second visit makes opportune a brief personal sketch of him as a scientist whose researches on accelerators of vulcanization have given him high rank in the field of rubber chemistry.

Professor Giuseppi Bruni was born August 25, 1873, in Parma, Italy, graduating from the University of Parma in 1896 as Doctor of Chemistry. He has devoted most of his professional life to teaching general chemistry, holding successively professorships in that department in the University of Bologna (1897); Polytechnic of Milan (1905); University of Parma (1906); University of Padua (1907-1917). From 1917 to the present time he has been professor of general chemistry at the Polytechnic of Milan, at the same time serving the Pirelli company as progress manager and head of the research department.

Professor Bruni was awarded the royal prize for chemistry by the Royal Academy of Science at Rome in 1913 and became a member of that society in 1918. His other scientific society memberships include The American Chemical Society, the Chemical Society of London, and the Society of Chemical Industry of London, as well as that of Paris, and of Milan, of which last-named he is now president. He is also chairman of the Board of Editors of *Giornale di Chimica Industria ed Applicata*. His many published papers in Italian and German relate to solid solutions, diffusion in metallic alloys, electrolysis in crystalline solid substances, thermal analysis of salt mixtures, etc.

Professor Bruni, in an interview specially granted to THE INDIA RUBBER WORLD during his stay in New York, furnished the data from which the following comprehensive account of Italy's rubber industry was prepared.

History and Development

The history of the Italian rubber industry is virtually that of her leading rubber company, the Societá Italiana Pirelli, Milan. This company was established in a small way in Milan in 1872 by the engineer G. B. Pirelli, and now operates two large plants in Milan and a third very large new plant located at Bicocca, three miles from Milan. The company also operates two rubber plantations in the Far East, one at Johore, near Singapore, Malaya, and one on the south coast of Java. In both plantations combined 10,000 acres are in production. The concession of acreage awaiting development is much larger.

Recently published data[1] indicate that the Pirelli company has developed into one of the world's important rubber manufacturers. Its capital is now 120,000,000 lire and it employs about 10,000 operatives in the manufacture of a great variety of rubber goods. This is half the total employed in the Italian rubber industry, which is located chiefly in the north. The larger plants are in Milan and Turin. The latter center is important rather for the number than the individual size of its rubber factories. Genoa, Florence, Leghorn, and Naples are centers for smaller works.

The beginning of rubber manufacturing in Italy was due to the initiative of G. B. Pirelli, under whose influence it made rapid progress, guided by the general advancement of rubber technology and rubber applications in America, England, and other countries.

Machinery and Equipment

Italian rubber manufacturers have equipped their plants with machinery built by the best Continental, English, and American makers. For example, the Pirelli company has a line of American mills and recently has installed an American 3-roll, 90-inch calender and a 4-roll, 100-inch calender of German make, both for coating tire fabrics. The company also builds in its shops machinery designed by its engineering staff. It is probably safe to say that the heavy machinery equipment of Italian rubber factories is imported, although very likely to a lessening extent.

Italian Rubber Products

In relative production importance pneumatic tires take precedence, with cables of various kinds second, followed by mechanical rubber goods, particularly belting for power transmission. The latter is fast gaining in importance because of the rapid development of hydro-electric power from mountain sources. Next in importance follow heels, weather-proofed fabrics, and druggists' sundries. Rubber footwear is not made because of the national lack of demand. Italy's pre-war supply of rubber footwear was imported from Russia. Since the failure of this source rubber footwear comes from the United States.

Automobile Tires

While the clincher fabric tire was formerly in large production in Italy, the cord tire is gaining favor with motorists and is now almost exclusively produced, both by Pirelli and by Michelin, Turin, but in the clincher rather than the straight-side form. The reason is that the rim equipment generally requires that type; therefore it is thought unnecessary to make the expensive change, since the advantage of cord over fabric construction can be obtained in the clincher form with no financial loss.

Straight-side cord tires are invariably required for racing, because of greater safety and speed.

Insulated Wire and Cables

Of the three factories of the Pirelli company one is devoted to making submarine cables and another to power cables and insulated wire.

A second important power cable and insulation factory is that of the Tedeschi Company, Turin. This concern was founded by a former Pirelli engineer many years ago and enjoys a high standing in the industry.

Pneumatic Bicycle Tires

In northern Italy the bicycle is commonly used by Italian workmen and peasants, causing a liberal tire demand. Bicycle tires

[1] THE INDIA RUBBER WORLD, April 1, 1923, 458.

are easily and cheaply produced and constitute the principal output of a number of the smaller factories, besides being produced in large numbers by Pirelli. In the aggregate their output runs into considerable volume.

Solid Tires

In Italy, as elsewhere, transportation problems are urgent and solution is found in motor transport for both goods and persons. Truck and bus lines now extend throughout the country, especially in the mountainous and southern sections, and in Sicily where railway facilities are poor. This service requires many solid tires and, besides Pirelli, three or four factories specialize in their manufacture.

Rubber Plant Chemical Control

Special mention should be made of the scientific plan of control of the Pirelli plants, which includes chemical research laboratory for advance investigation of rubber problems; chemical control laboratory for examination of raw materials and supplies; compounding laboratory for study of rubber mixings and preparation of stocks to specifications; and physical laboratory with apparatus and machines for physical testing. In addition to these laboratories the Pirelli cable factory has one of the largest and best equipped electrical testing laboratories to be found in Europe.

Magnitude of the Industry

There are at present in Italy 13 firms engaged in the production of rubber goods, insulated wire and cables, giving employment to about 20,000 persons. Italian imports of crude rubber have steadily advanced in tonnage since 1909 to 4,400 tons in 1921, although the last figure seems to be too low. In 1919 the total value of rubber manufactures produced by Italian factories was estimated at 225,000,000 lire, about one third being exported. Figures for 1922 must be very considerably higher.

STATEMENT OF THE INDIA RUBBER WORLD

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of THE INDIA RUBBER WORLD, published monthly at New York, N. Y., for April 1, 1923.

State of New York, } ss.:
County of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared E. M. Hoag, who having been duly sworn according to law, deposes and says that she is the business manager of THE INDIA RUBBER WORLD, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The India Rubber Publishing Co., 25 West Forty-fifth Street, New York City.

Editor, Henry C. Pearson, 25 West Forty-fifth Street, New York City.

Managing Editor, Henry C. Pearson, 25 West Forty-fifth Street, New York City.

Business Manager, E. M. Hoag, 25 West Forty-fifth Street, New York City.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

The India Rubber Publishing Co., 25 West Forty-fifth Street, New York City.

Henry C. Pearson, 25 West Forty-fifth Street, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

E. M. Hoag, Business Manager.

Sworn to and subscribed before me this 31st day of March, 1923.

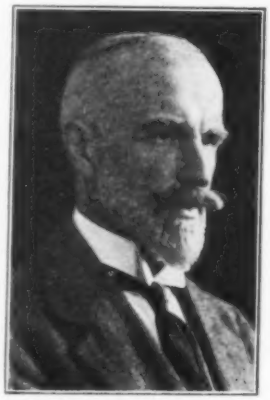
[SEAL] WALTER S. THOMPSON, Notary Public.

(My commission expires March 30, 1925.)

H. Greville Montgomery, M. P., Rubber Publicist

By a London Editor

One of the quiet but powerful forces in the British rubber industry is H. Greville Montgomery, the Editor-in-Chief of the London *Rubber Age*. Rubber men the world over have a habit of coming to him with all kinds of unexpected problems and difficulties, and they are never disappointed. With his help, they usually find their way out. He is a popular figure in London clubland, a member of the Reform Club and the more Bohemian Savage Club; and his brother "Savages" call him with pride and much truth "The man who gets things done."



H. Greville Montgomery

He started his career as a journalist with the late Sir C. Arthur Pearson, the great friend of the blind, when he was little more than twenty years of age. Both had pretty strong wills, and inevitably there came a day when there was a clash, and young Montgomery took up his hat and walked out of *Pearson's Weekly* office, vowing that he would never serve another employer. He never has. That's the man. He keeps his promises to himself. He founded an amazingly successful paper known as *The British Clayworker;* organized the Institute of Clayworkers; arranged the first Colliery Exhibition held in England and the Building Trades Exhibitions at Olympia; and, quite incidentally to these tasks, fought and won a seat in the British House of Commons as M. P. for Bridgewater.

He was the man who defeated the whole government and the British Treasury single handed in an attempt to tax clay as a mineral. How? Simply by organization.

The truth, of course, is, he is a born organizer. He can't help it. And naturally rubber has exercised over him an irresistible fascination,—it has had so many ups and downs and, in England, has oftentimes lacked the right type of friends. He took over the International Rubber Exhibition in London in 1919 and made a huge success of it. Next year he will open this exhibition in Brussels under the direct patronage of the Belgian Government, and no doubt will score another practical and spectacular triumph, for, although he can make a capital speech, he is really a tireless worker and he never spares himself or his colleagues an ounce of detail. He loves work—tons of it.

Sometimes he looks for it. He did a few weeks ago when he passed the noisy British War Cenotaph. "That's bad," he said, "bad for world pilgrims." And next day the need of a zone of silence for it—in the shape of a rubber-lined road—had been brought directly to the notice of King George, Mr. Bonar Law, Mr. Lloyd George, His Majesty's First Commissioner of Works, and other British notabilities, in personal letters from H. G. Montgomery himself. He did not wait to invoke the British Parliament or any British rubber association. No. He got to work himself. Quite incidentally he also ran a world-wide campaign in the press, in favor of rubber zones of silence for all war memorials—but the readers of THE INDIA RUBBER WORLD read all about that two or three months ago, directly it happened. Now they know something about the man who is back of it.

"Rubber Machinery," by Henry C. Pearson, should be in the library of every rubber company.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

(188) A correspondent wishes to be informed where "Goulac" may be purchased.

(189) A reader inquires where he can obtain equipment for manufacturing rubber stamps.

(190) We are asked for the names of manufacturers of flexible rubber varnish.

(191) Information is desired as to the method employed to remove tubes without reversing; also as to the process of marking tubes on the rough side.

(192) Addresses are asked for of reclaimers of rubber stock.

(193) An inquirer wishes to know where he can purchase large quantities of solid round rubber thread with a cotton thread core, or the machines to make it.

(194) A correspondent wishes names and addresses of manufacturers who supply rubber sponges.

(195) We are asked for addresses of manufacturers of heel trimming machines.

(196) A reader wishes to know where he can get a rubber test bag for an air test on 4" soil line.

(197) A list is requested of makers of sponge rubber.

(198) A reader asks for the address of a concern specializing in overhead trolleys, track systems, etc.

(199) A manufacturer inquires for a source of supply of sponge rubber in continuous lengths in solid tubular form.

(200) Inquirer wishes to know where he can purchase bone black.

(201) We are asked for information relative to miners of Pennsylvania ochre.

(202) A reader wishes to know where he can purchase hose and bath sprays.

Foreign Trade Opportunities

Addresses and information concerning the inquiries listed below will be supplied to our readers through the Foreign Trade Bureau of The India Rubber World, 25 West 45th street, New York, N. Y. Requests for each address should be on a separate sheet and state number.

(5811) Drygoods, including waterproofs—Sweden. Agency. Quote c. i. f. Swedish port.

(5845) Surgeons' rubber gloves—Sweden. Purchase. Quote c. i. f. Swedish port. Cash against documents.

(5873) Sporting goods, including gymnasium apparatus, articles for tennis, football, golf, etc.—Switzerland. Purchase. Quote in French, Italian, or German, c. i. f. Swiss destination.

(5901) Tire inflation equipment, including 200-pound pressure air tank, 1-h.p. electric motor, and a 2-cylinder pump.—Mexico. Purchase. Terms, cash. Quote c. i. f. El Paso, Texas.

(5906) Ebonite—Switzerland. Purchase. Terms, cash against documents. Quote in French c. i. f. Havre and Antwerp.

(5907) Automobile tires—Austria. Agency. Quote f. o. b. New York.

(5907) Automobile tires—Austria. Agency. Quote f. o. b. New York.

(5954) Boots, shoes, rubber shoes, and hosiery—Canada. Purchase. Quote, f. o. b. Canada.

(5988) Toy balloons and novelties of all descriptions—England. Purchase or agency. Quote c. i. f. English port. Terms, cash.

(5992) Toys, games and novelties, including toy balloons—Chile. Purchase. Quote in Spanish, c. i. f. port of shipment.

(6002) Novelties and small articles, including fountain pens—France. Agency.

(6049) Small vulcanizing outfits and automobile accessories—Italy. Purchase or agency. Quote in Italian, c. i. f. Italian port. Cash against documents.

(6069) Rubber balloons, all sizes—England. Purchase. Quote c. i. f. English port.

(6084) Rubber boots, moccasins, sport shoes, etc., for men, women and children—East Africa. Purchase and agency. Quote c. i. f. Kilindini. Cash against documents.

(6119) Transmission belts of balata and leather and rubberized canvas hose—Warsaw, Poland. Purchase and agency. Quote in Polish and German, c. i. f. Danzig.

(6147) Rubber jars for storage batteries, 6 and 12 volt—Shanghai, China. Purchase and agency.

RAILROAD MECHANICAL GOODS IN DEMAND

The railroads have authorized since January 1, 1922, for cars, locomotives, and other facilities, the expenditure of $1,540,000,000, of which $440,000,000 was actually expended during the year 1922. From January 1, 1922, to March 15, 1923, the railroads purchased 223,616 new freight cars. Of these 117,280 have been delivered and put in service. The railroads during that time also purchased 4,219 new locomotives. Of that number 2,106 have already been placed in service. Practically all the equipment still on order is to be delivered by fall, at which time freight traffic is always the heaviest.

According also to the committee on public relations of the eastern railroads there were ordered during the week ended April 7, 55 locomotives, 450 freight cars, and 36 passenger cars. This brings the total equipment ordered this year to date by the railroads up to 1,412 locomotives, 51,670 freight cars and 715 passenger cars.

There are three distinct types of rubber hose used with every passenger coach in use. These are air-brake, air-signal, and steam-heat hose, while the whole train, including locomotive, has uses for rubber hose, packing, belting, gaskets, floor and step treads, curtains, etc., all of which means business for the manufacturers of mechanical rubber goods.

HOLLAND LINERS

Manufacturers of unvulcanized sheet rubber compositions for tire repairs, rubber stamps, dental gum, and similar purposes require a glazed holland to serve as a liner or surfacing to retain on the stock the smooth calendered surface.

Rubber hollands suited to this purpose are fabricated and glazed both sides. Two hollands popular with rubber manufacturers are the Red Seal and Gold Seal brands, which are of different weights and come 36 and 40 inches wide in 120-yard rolls.—The Western Shade Cloth Co., 43 Leonard Street, New York, N. Y.

WHITFORD HEADS RUBBER INVESTIGATION

The Department of Commerce has anounced that the proposed government investigations regarding the crude rubber situation will be conducted by Harry N. Whitford, professor of tropical forestry at Yale University. Professor Whitford's previous studies, aside from his six years of work as head of his department at Yale, have included six years as chief of the division of investigations for the Bureau of Forestry of the Philippine Government, and three years of special work in various rubber-producing countries of South and Central America, and Mexico.

In the coming investigation especial attention will be given to studying the sources of the crude rubber supply, and the possibilities of developing rubber plantations in the Philippine Islands and Latin America.

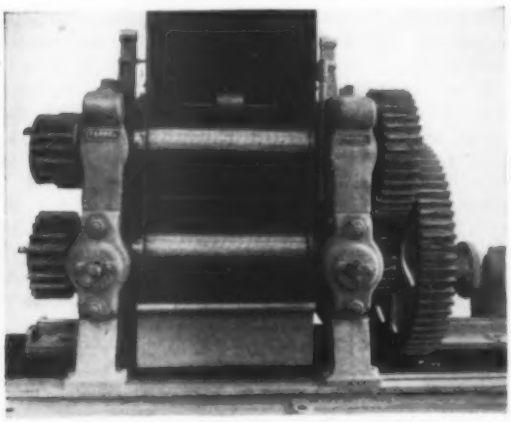
New Machines and Appliances

Four-Roll Rubber Washer

A NEW departure in design of rubber washers, than which nothing more novel has appeared in years, is the machine here shown in two views, each with gear guards removed.

The machine is practically two ordinary rubber washers arranged one over the other, housed to confine the water used, and so speeded that the rubber sheet is washed under tension as it passes from the upper to the lower rolls. This stretching action tends to dislodge adhering foreign matter, and pipes located beneath the upper rolls spray water onto each side of the stretched sheet.

Therefore, it is claimed that much cleaner rubber is produced and in less time than by any other method. The bark, dirt, and other impurities washed out by the upper rolls fall onto the lower



Young's Four-Roll Washer—Front View

ones and are carried off at the ends of these rolls, which have no guides to hinder the free flow of the water-borne impurities. Both pairs of rolls are driven and connecting gears at opposite ends of the rolls give the proper surface speed ratio for stretching the sheet.

Owing to the nearly automatic action of the washer, one operator can handle two or three machines, depending upon his

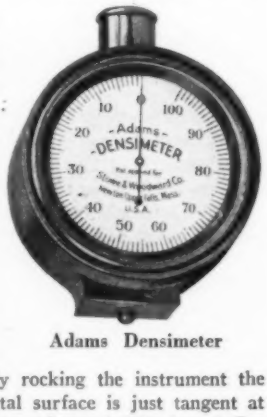
Young's Four-Roll Washer—Side View

skill and the rubber being washed.—The Farrel Foundry & Machine Co., Ansonia, Connecticut.

Densimeter for Rubber

A convenient pocket instrument for determining the firmness of cure of vulcanized rubber in accordance with a standard scientific scale is here shown.

The readings of the densimeter are in exact proportion to those of the plastometer and correspond to the latter when multiplied by two. This feature and the fact that the instrument is the product of skilled makers of precision instruments make it of great value in the rubber industry, for it enables one to specify the density of an article of rubber in a scale universally understood.



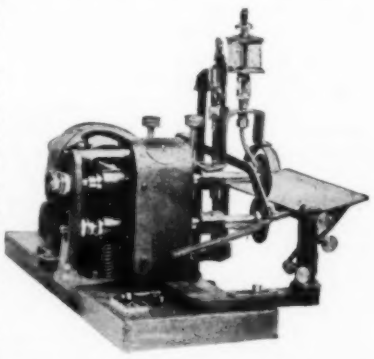
Adams Densimeter

The instrument is operated by pressing the ball against the rubber until flush with the metal surface of the instrument. By slightly rocking the instrument the lowest reading shows when the metal surface is just tangent at the ball. The reading is then correct.—Stow & Woodward Co., Newton Upper Falls, Massachusetts.

Improved Rubber Overflow Trimmer

The new model C M of the well-known Wills rubber overflow trimmers for trimming heels, soles, disks, round mats, nipples, and various other forms of molded rubber articles, is here pictured.

In Model C the belt-drive has been effectively replaced with a chain and sprocket running direct to the gears that operate the spindles, the advantages being that it delivers more constant power and eliminates slippage.



Wills' Model CM Overflow Trimmer

Other salient features of this model are: The ball thrust bearing on the cutter shafts prevents heating and insures perfect cutter alinement; the adjustability of the cutting edges of the knives; and the elevation and lowering of the work table to any desired angle, thus greatly facilitating the work.

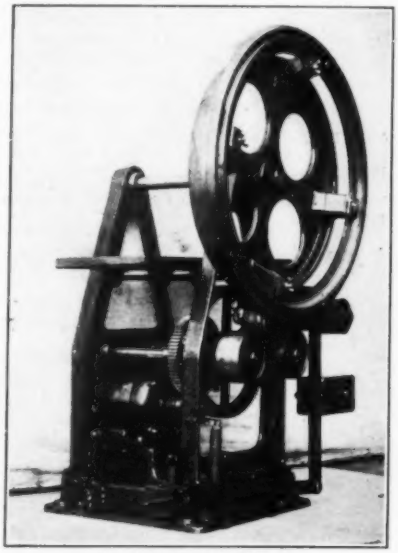
The gears are enclosed and when very close knife adjustment is required smaller gears are used.

Still further developments of the Wills trimmer are found in Model C M shown herewith.

It is a compact factory unit with an enclosed type motor mounted on the same base with the trimmer. The control switch is convenient to the operator and all wiring is run in metallic covering under the base. A safety guard affords protection to the operator and a sight feed lubricator supplies oil or water to the cutter edges. The use of oil in trimming departments by this system results in much economy of time besides maintaining the cutters in good order.—Arthur Jackson Wills Estate, North Brookfield, Massachusetts.

Bead Flipping Machine

The bias strip of frictioned fabric which surrounds a tire bead is known as a bead flipper. The machine here pictured applies the bead flipper on any one of its three sides or on all sides, as desired. The machine is constructed on a substantial base cast in a single piece, and machine-cut gearing and steel shafting are used throughout. The boxes are babbitted and built to maintain permanent alinement.



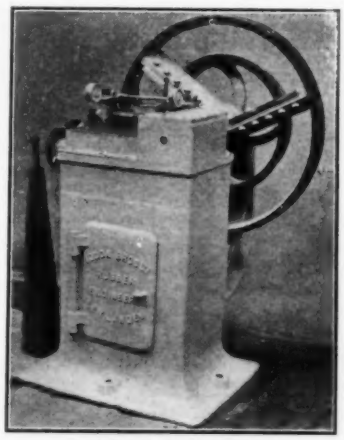
Banner Bead Flipper

In operation the motor and gearing are in continuous motion. Depressing the pedal brings the plate holding the bead into frictional contact with the diving plate. On releasing the pedal the bead-holding plate stops, permitting variation of the flipper covering operation to the construction desired. The fabric may be placed on the bead-holding plate and the bead laid upon it and spun down, or vice versa.

It is claimed that this is the only machine that will apply the fabric tightly all around the bead, and can be operated by unskilled labor.—The Banner Machine Co., Columbiana, Ohio.

Rubber Band Cutter

A new British machine for cutting rubber bands is that pictured here. It is very strongly built and has three cutters mounted upon arms set in a heavy fly wheel and arranged at correct angle with the stationary cutting blade. Special means are provided for adjusting the cutters for wear.



Iddon's Band Cutter

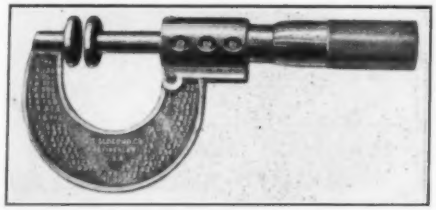
The stock is fed through a pair of positively geared feed rolls operated by a train of cut gears to an intermittent three-stage feeding device driven from the main shaft and fully enclosed by a cover, which also serves as a feed table.

The machine admits stock up to ten inches in width and will cut bands from 1 mm. wide up to 5 mm., varying by ¼ mm. intervals; and from 5 m. to 25 mm. by ½ mm. intervals by means of change gears. A further feed regulating device enables ten different widths of bands to be cut without changing gears.

An important feature is the automatic arrangement for holding the stock in position while being cut. This is easily adjusted to accommodate very fine or heavy tubes with the exact degree of pressure required.—Iddon Brothers, Limited, Leyland, Lancashire, England.

Direct Reading Micrometer

The micrometer here shown, with large measuring faces, is designed for measuring sheet rubber, paper, or other yielding material.



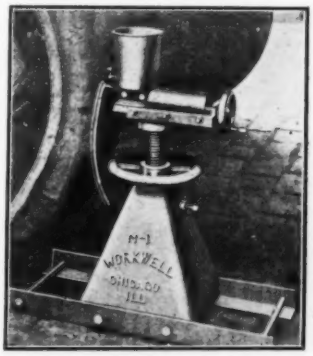
Sheet Rubber Micrometer

The unusual feature of the instrument is special counting mechanism now for the first time applied to a micrometer caliper. This device adds but little to the size and weight of the instrument and is so placed as to balance it nicely.

The reading is direct on every thousandth inch and reads from zero to 999. For measurements to an accuracy of .0005 inch, it is only necessary to see that the right hand figure is about central in its aperture.—J. T. Slocomb Co., Providence, Rhode Island.

Solid Tire Regrooving Machine

The practice of regrooving solid tires to retain resiliency and non-skidding properties is gaining favor among truck owners and service stations.



Workwell Solid Tire Groover

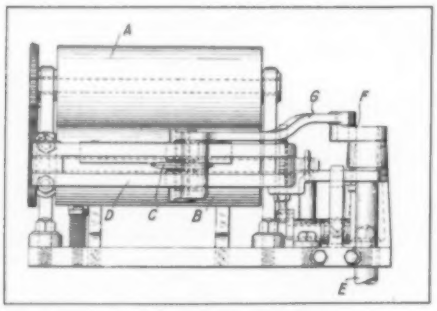
The illustration shows a machine for grooving tires without removal from the wheels. One wheel is jacked up at a time, the machine set close to the tire where the groove is wanted, the cutting blade raised to a point slightly above the horizontal diameter of the wheel, and the motor started with gears in low speed. As the jacked-up wheel revolves backward the hand wheel is turned until the groove is cut to proper depth. The machine is simple, sturdy, and durable.—The Workwell Engineering Co., 4143 West Kinzie street, Chicago, Illinois.

Machinery Patents

Rubber Strip Cutting Machine

A machine for cutting fringe on the edge of cured sheet rubber to be used in trimming bathing caps, capes, etc., is shown herewith in front elevation.

The machine comprises two rolls A and B, of equal size and speed, geared together and mounted on a base. The revolution of the rolls is intermittent, feeding the sheet forward at each cut of the revolving and reciprocating knife C, which moves along the face of roll B in one direction to slit the sheet against the roll serving as a platen, and being removed from the roll while moving in the reverse direction. The interval is used to feed the sheet the distance requisite for the next slit. The cutter C is journaled on a shaft carried by slide blocks, the blocks and shaft constituting a cross-head guided by the frame D and actu-

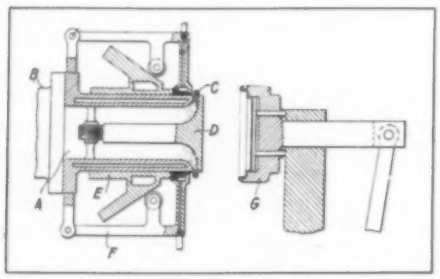


Rubber Fringe Cutter

ated by the vertical shaft E and the crank F and link G.—James W. Brundage, assignor to the Miller Rubber Co., both of Akron, Ohio, United States patent No. 1,448,723.

Gasket Forming and Applying Machine

The illustration is a vertical section of an extruding head and die A, attached to a tubing machine B, arranged to form a gasket or ring at C, where the material is flared outwardly by the mandrel D. Surrounding the die is a sliding sleeve E, which



Rubber Gasket Machine

is timed by the link and roller mechanism F to periodically cut gaskets from the extruded plastic mass.

The mechanism G mounted in front of the die comprises a holder for supporting a jar cover to receive the extruded gasket and being timed to advance and recede as the gaskets are formed, pressing them into the covers successively.—Willis J. Peele, Chicago, Illinois, United States patent No. 1,447,816.

Other Machinery Patents

The United States

1,447,441 Machine for making tire carcasses. W. C. Stevens, assignor to The Firestone Tire & Rubber Co.—both of Akron, Ohio.

1,448,481 Traveling tire vulcanizing system. M. C. Bright and J. M. Brautigam, Indianapolis, Ind.

1,448,723 Fringe cutting machine. J. W. Brundage, assignor to The Miller Rubber Co.—both of Akron, Ohio.

1,449,445 Machine for cutting sheet rubber. L. H. Rand, assignor to Brooklyn Shield & Rubber Co.—both of Brooklyn, N. Y.

1,449,744 Dipping machine. J. R. Caldwell, assignor to The Seamless Rubber Co., Inc.—both of New Haven, Conn.

1,449,930 Machine for treating rubber and other heavy plastic material. E. H. Banbury, Ansonia, assignor to Birmingham Iron Foundry, Derby—both in Conn.

The Dominion of Canada

229,136 Shoe press. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of H. R. Polleys, New Haven, Conn., U. S. A.

229,138 Mixing machine. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of E. Eger, Detroit, Mich., U. S. A.

229,139 Mixing machine. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of E. Eger, Detroit, Mich., U. S. A.

229,140 Apparatus for refinishing blemished tires. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of W. Keans and H. P. Connelly—both of Detroit, Mich., U. S. A.

229,405 Expansible core. The Goodyear Tire & Rubber Co., assignee of B. Darrow—both of Akron, Ohio, U. S. A.

229,406 Interlocking mold. The Goodyear Tire & Rubber Co., assignee of K. B. Kilborn—both of Akron, Ohio, U. S. A.

229,503 Combined contractor and expander for automobile tire rims. A. C. Hoecker, Collinsville, Ill., U. S. A.

The United Kingdom

191,711 Tire press vulcanizer. Soc. Anon. des Etablissements A. Olier, Clermont-Ferrand, Puy-de-Dôme, France. (Not yet accepted.)

191,785 Press vulcanizer. W. K. Fletcher, 14a Nevern Mansions, Warwick Road, Kensington, and J. Rushmere, The Shanty, Amerland Road, West Hill—both in London.

191,903 Sheet rubber vulcanizer. P. M. Matthew, Victoria India Rubber Mills, Leith Walk, Edinburgh, Scotland.

192,475 Solid tire mold. A. A. Thornton, 8 Quality Court, Chancery Lane, London; Lambert Tire & Rubber Co., Inc., Akron, Ohio, U. S. A.

Germany

Patents Issued, with Dates of Issue

372,484 (July 2, 1921). Calender for rubber and similar plastic materials. Albert Boecler, Malmö, Sweden; represented by Dr. Specht, Hamburg 1.

372,485 (June 25, 1920). Device for vulcanizing presses for putting in and taking out forms. The Dunlop Rubber Co., Limited, London; represented by R. H. Korn, Berlin S. W. 11.

372,801 (July 30, 1921). Fastening for kettle presses, particularly for vulcanizing rubber (addition to patent No. 362,097). Wenzel Miersch, Westhafen, Frankfurt-am-Main.

372,802 (February 14, 1922). Fastening for kettle presses, especially for vulcanizing rubber (addition to patent No. 372,801). Wenzel Miersch, Westhafen, Frankfurt-am-Main.

373,067 (September 7, 1921). Device for forming plastic masses. Wilhelm Armbrecht, Hobrechtstrasse 61, Neukölln.

373,236 (March 25, 1920). Machine for rolling fabric lining for rubber hose. Hermann Krug, Lärchenberg 7, Hannover.

373,485 (July 14, 1921). Apparatus for splicing and vulcanizing pneumatic tires. The Pneumatic Tube Steam Splicer Co., Baltimore, Maryland, United States; represented by Dr. R. Geissler, Berlin S. W. 11.

Process Patents

The United States

1,447,239 Manufacture of rubber soles. G. Ferguson, Wollaston, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J.

1,447,816 Process of forming and applying gaskets and the like. W. J. Peelle, Chicago, Ill.

1,448,286 Method of decorating automobile tire casings. J. D. Comstock, Chester, W. Va.

1,449,504 Method of and apparatus for compressing elastic fluids. R. N. Ehrhart, assignor to Elliott Co.—both of Pittsburgh, Pa.

1,449,760 Hose and method of making same. E. G. Kimmich, assignor to The Goodyear Tire & Rubber Co.—both of Akron, Ohio.

The Dominion of Canada

229,134 Manufacture of footwear. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of D. W. Deshler, New Haven, Conn., U. S. A.

229,233 Construction of collapsible cores. T. Midgley, Sr., Hampden, Mass., and T. Midgley, Jr., Dayton, Ohio, assignee of The Fisk Rubber Co., Chicopee Falls, Mass.—all in the U. S. A.

229,369 Process of treating rubber. W. B. Wiegand, Montreal, Quebec.

229,380 Vulcanization of rubber. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of S. M. Cadwell, Leonia, N. J., U. S. A.

The United Kingdom

192,039 Method of protecting india rubber bales. E. Hopkinson, 1790 Broadway, New York City, U. S. A. (Not yet accepted.)

192,057 India rubber composition. Naamlooze Vennootschap Vereenigde Nederlandsche Rubberfabricken, Doorwerth, near Arnhem, Holland. (Not yet accepted.)

192,143 Sponges, etc. O. Vianello, 6 Via San Giovanni, Trieste, Italy.

192,175 Rubber paving roads, etc. R. H. Rogers, 10 Iddesleigh House, Caxton street, Westminister.

Germany

Patents Issued, with Dates of Issue

373,092 (March 18, 1921). Method for making tire covers. Juan Ortiz-Escofat, Barcelona; represented by Dr. Lotterhos, Frankfurt-am-Main.

The Cameron Principle of Cutting

In general rubber manufacturing there is constant need for cutting into strips calendered rubber sheet stock, plain and rubberized fabrics of all sorts, paper, etc. This is accomplished by several common methods; namely: (1) Cutting with hand shears to a line drawn on the goods; (2) cutting by hand knife to a straight edge; (3) cutting by thin blades held against the calendered sheet as it passes from the calender under the blades; (4) cutting by very thin slitting disks, revolving at high speed and acting somewhat like circular saws except the edges of the disks are smooth and sharp. The cutting edges soon dull, however, and the slitting becomes more like tearing than cutting; (5) cutting by the circular shears method, in which circular disks are arranged in pairs with sharp edges slightly overlapping. This method has been widely employed and was possibly the best available hitherto.

While some of these methods are better than others none is satisfactory from the standpoint of efficiency and economy. Each is in use somewhere, however, but all are destined to be superseded generally, as they already have been in the more progressive companies, by the scientific method known as the Cameron principle of slitting, which may be accepted as the one right way so far developed.

Cameron Principle of Slitting

The Cameron principle of slitting reduced to its simplest terms for clearness of illustration is shown in Fig. 1. The material to be slit passes between a cutter wheel with a V-shaped edge which is spring pressed against the surface of a steel roll highly polished and glass hard. By this means any sort of material, whether

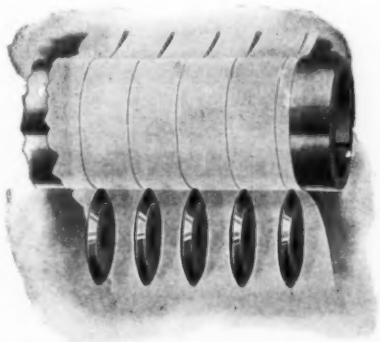


Fig. 1—Cameron Principle of Slitting

woven fabric, felt, paper, rubber, asbestos, metal foil, insulating compounds, etc., may be clean-cut without stretching or distortion, in much the same way as a cold chisel does its work. The edge of the disk is not very sharp. The slitting is done by pressure rather than by a keen cutting edge. In practice it has been found that this combination of disks and roll is practically indestructible and that slitting can be done at an almost unlimited rate of speed and with faultless results. The action of cutting on this plan is known as a "scoring cut" and is further described and illustrated below.

Application of Score-Cut Slitter

The score cutter consists of cutting or scoring disks with V edges mounted so as to revolve under spring pressure in contact with the surface of the material to be slit. The pressure forces the edges of the cutters through the material and against a backing roll with hard glass surface, leaving the cut strips lying evenly side by side as they pass over the roll. The disks or score cutters are mounted on ball bearing centers. The manner of mounting and spacing is indicated in Fig. 2. Any assortment of widths may be cut at one operation. The backing or cutter roll with glass hard surface, against which the cutters act, is made up of several hollow shells mounted on a core shaft. In this way

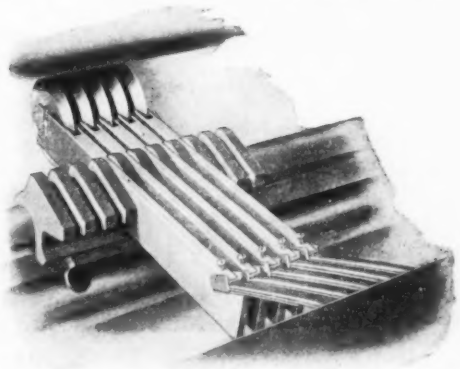


Fig. 2—Cameron Score Cutters Mounted in Gang Spacing Block

the highest degree of hardness and finish is obtained. The roll surface is not affected by the action of the cutters nor does it become marred with grooves.

The strips are cut straight and even at a high rate of speed, ready for rewinding into separate rolls without overlapping or interweaving of edges.

Judicial Decisions

FEDERAL TRADE COMMISSION VS. KEATON TIRE & RUBBER CO. Findings as to the facts at a regular session of the Federal Trade Commission, Washington, D. C. Decided December 27, 1922. Docket No. 882.

The respondent being found guilty of unfair methods of competition in commerce was ordered to cease and desist from publishing or representing to the public or to dealers or jobbers, either by printing the same on its rim parts display boards or in any other manner, that the use of any device other than the rim parts manufactured and sold by the maker of the rim is dangerous to the rim or rim equipment, or from representing or publishing any statement to the same or similar effect.

FEDERAL TRADE COMMISSION VS. AMALGAMATED TIRE STORES Corporation. Findings as to the facts at a regular session of the Federal Trade Commission, Washington, D. C. Decided January 9, 1923. Docket No. 888.

The respondent being found guilty of unfair methods of competition in commerce was ordered to cease and desist from directly or indirectly advertising, selling or offering for sale in interestate commerce automobile tires as "First" or "Absolutely First" or "Strictly First" or "Every Tire is fresh from the best known factories" or "All standard makes of first" unless said tires are in truth and in fact correctly and properly so described.

Appraisers' Decisions

No. 45800.—Protest 950866 of Pacific Trading Co. (San Francisco). SPONGE BALLS.—In sustaining a protest made by the Pacific Trading Co. the United States Board of General Appraisers agreed that certain imported sponge balls are not toys, and therefore should not be assessed at 35 per cent ad valorem. In the opinion of Judge Waite, and using decisions in similar cases as precedents, the rate should be but 10 per cent ad valorem under paragraph 368, Tariff Act of 1913, as manufactures of rubber.—*Treasury Decisions*, Vol. 43, No. 15, page 14.

REPLETE WITH INFORMATION FOR RUBBER MANUFACTURERS—H. C. Pearson's "Crude Rubber and Compounding Ingredients."

Activities of the Rubber Association of America

Division and Committee Meetings

THE Specification Committee of the Mechanical Rubber Goods Manufacturers' Division held a meeting on April 2. For the past two years the committee has been collaborating with a committee representing the American Railroad Association in forming specifications for various types of railroad hose and one for axle light belting. At a recent meeting held in Pittsburgh, the Committee on Specifications and Tests for Materials of the A. R. A. accepted the proposed specifications, with minor exceptions, and decided to present them to the entire membership of that association as "recommended practice." The Specification Committee of the Rubber Association believes that the tentative specifications will be adopted by practically all of the important railroads of the country, which will mean a great deal to hose and belting manufacturers. The Specification Committee also completed consideration of the Proposed Standard A. R. A. Specifications for Packings, which, it is believed, will also be approved by the American Railroad Association committee having the matter in charge.

The exchange of credit information on customers, the standardization of battery jars and containers, and the compilation of monthly statistics concerning the production of battery jars and containers, were the subjects of major importance discussed at the meeting of the Hard Rubber Division, held at the Yale Club, New York, on April 4.

A two-day meeting of the Service Managers' Committee of the Tire Manufacturers' Division was held in Cleveland on April 5 and 6. The committee gave further consideration to the pamphlet on "The Care of Pneumatic Tires" and made several changes, including the addition of a list of the members of the Tire Manufacturers' Division.

A conference of rubber sundries manufacturers, including glove, balloon, sheet-goods, bathing caps, slippers, and rubber band makers, under the auspices of the Rubber Sundries Manufacturers' Division of the association, was held in New York on April 6, members and non-members of the association being present. The Rubber Sundries Manufacturers' Division has not accomplished the adoption of sound business principles and corrected dangerous trade abuses because there has not been more complete representation and active support of the manufacturers. The consensus of opinion of the conference was that it is only by joint action on the part of producers that desirable conditions can be brought about, and all present endorsed the proposal to segregate its members into sections, such as the Glove Section, Bathing Cap Section, Balloon Section, etc. On the evening of the same day, in conjunction with the conference, an informal dinner was held at the Yale Club, in which both members and non-members took part. The occasion was particularly fitting at that time as it commemorated the twenty-fifth anniversary of the founding of the original Rubber Sundries Manufacturers' Association, which was later taken over by the Rubber Club of America.

On April 9 the Automobile Fabric Manufacturers' Division held a meeting at the Yale Club, New York, when subjects of a nature intimate to that trade were discussed, including the formulation of uniform order and acknowledgment forms.

The Traffic Committee of the association met on April 10 and prepared proposals for its appearance before the Official Classification Committee, the rate-making body for eastern railroads, relative to reductions in the carload rates on rubber soles and heels and on solid tires. The Traffic Committee also discussed questions relating to tire wrapping and its proposal to have scrap rubber rates applied to used tires returned to factories.

The Accounting Committee met in the association office on April 11 and discussed details connected with the employment of professional assistance for that committee in the formulation of uniform cost accounting fundamentals for rubber manufacturers. This work will be conducted by the Accounting Committee with the assistance of a cost accounting man who will be added to the staff of the Rubber Association office.

On April 19 the quarterly meeting of the Executive Committee of the Mechanical Rubber Goods Manufacturers' Division was held at the Yale Club. A number of matters relating to that trade were considered by the committee.

The Tire Specification Committee, which is composed of technical representatives of a number of members of the Tire Manufacturers' Division, again met with representatives of the Bureau of Standards in the association office on April 20 and discussed in detail the committee's proposals as to the substitution of certain physical tests in place of detailed chemical and construction requirements in the Bureau's specifications for casings, inner tubes and solid tires.

The regular quarterly meeting of the Tire Manufacturers' Division which was scheduled to be held on April 25 was postponed as a number of the subjects which were to have been discussed were not in shape for presentation at that time. The Ex-

Report of Inventory—Production—Domestic Shipments of Pneumatic Casings—Inner Tubes—Solid Tires, Etc.

	Pneumatic Casings				Inner Tubes				Solid Tires			
Month	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments
February, 1922	66	4,691,329	2,084,308	1,562,365	65	6,141,956	2,596,774	1,702,583	11	183,448	39,492	36,805
March, 1922	63	5,183,286	2,645,790	2,073,963	63	6,991,118	3,017,511	2,090,737	11	182,197	49,433	48,350
April, 1922	65	5,464,336	2,401,187	2,086,651	65	7,230,096	2,650,573	2,329,343	11	173,748	46,664	52,309
May, 1922	65	5,523,095	2,721,503	2,639,273	65	7,189,552	2,970,696	2,938,947	11	170,904	57,640	60,711
June, 1922	64	5,042,147	2,838,890	3,133,260	64	6,186,534	3,130,629	3,973,679	11	169,808	66,089	63,408
July, 1922	63	4,834,106	2,476,636	2,695,095	63	5,675,839	3,068,199	3,630,744	11	176,375	71,505	60,425
August, 1922	63	4,629,392	2,905,209	3,029,823	63	5,207,228	3,808,224	4,220,055	11	189,698	84,313	69,435
September, 1922	64	4,612,037	2,504,744	2,502,106	64	5,164,757	3,501,442	3,558,971	11	200,016	82,767	66,797
October, 1922	64	4,682,958	2,674,662	2,588,770	64	5,488,033	3,787,758	3,420,680	11	213,942	85,480	71,275
November, 1922	62	4,964,976	2,733,134	2,379,708	61	6,210,053	3,850,908	3,075,023	11	234,684	85,775	61,466
December, 1922	59	4,599,208	2,656,942	2,934,079	59	5,732,125	3,411,074	3,825,949	10	244,061	77,221	64,570
January, 1923	62	4,695,916	3,127,270	2,994,297	62	5,838,310	3,951,885	3,748,651	11	262,462	83,343	60,611
February, 1923	60	5,224,387	3,217,987	2,588,639	60	6,771,958	4,039,202	3,001,697	11	270,191	75,457	63,394

"Production" and "Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.
"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.
"Shipments" includes only stock forwarded to a *purchaser* and does not include stock forwarded to a warehouse branch, or on a consignment basis, or abroad.

Compiled by The Rubber Association of America, Inc.

ecutive Committee of the Tire Manufacturers' Division met on that day, however, and considered several matters of a routine nature.

The regular monthly meeting of the Board of Directors of the association was held at the Lotos Club on April 26. The questions considered by the board were also of a routine nature, relating to the functions of the association.

Standing Committees

The following are the personnel of the various standing committees recently appointed by President De Lisser:

Executive Committee

Horace De Lisser (Chairman), Ajax Rubber Co., Inc., 220 W. 57th street, New York, N. Y.; W. O. Rutherford, The B. F. Goodrich Co., Akron, Ohio; G. M. Stadelman, Goodyear Tire & Rubber Co., Akron, Ohio; W. E. Bruyn, L. Littlejohn & Co., Inc., 133-137 Front street, New York, N. Y.; J. N. Gunn, United States Tire Co., 1790 Broadway, New York, N. Y.; H. T. Dunn (Ex-Officio), The Fisk Rubber Co., 250 W. 57th street, New York, N. Y.

Nominating Committee

Bertram G. Work, The B. F. Goodrich Co., 1780 Broadway, New York, N. Y.; Harvey S. Firestone, Firestone Tire & Rubber Co., Akron, Ohio; George B. Hodgman, Hodgman Rubber Company, 25 W. 43rd street, New York, N. Y.; Homer E. Sawyer, United States Rubber Co., 1790 Broadway, New York, N. Y.; Harry T. Dunn, The Fisk Rubber Co., 250 W. 57th street, New York, N. Y.

Legislative Committee

Charles Neave (Chairman), General Counsel of The Rubber Association of America, Inc., 5 Nassau street, New York, N. Y.; F. C. Van Cleef, The B. F. Goodrich Company, Akron, Ohio; Ernest Hopkinson, United States Rubber Co., 1790 Broadway, New York, N. Y.

Auditing Committee

E. M. Bogardus (Chairman), The Fisk Rubber Co., 250 W. 57th street, New York, N. Y.; W. O. Cutter, United States Rubber Co., 1790 Broadway, New York, N. Y.

Investments Committee

J. Newton Gunn (Chairman), United States Tire Co., 1790 Broadway, New York, N. Y.; G. B. Hodgman, Hodgman Rubber Co., 25 W. 43rd street, New York, N. Y.; F. R. Henderson, F. R. Henderson & Co., 111 Broadway, New York, N. Y.

Budget Committee

J. Newton Gunn (Chairman), United States Tire Co., 1790 Broadway, N. Y.; W. O. Rutherford, The B. F. Goodrich Company, Akron, Ohio; S. G. Lewis, Pennsylvania Rubber Company, Jeannette, Pa.

Membership Committee

W. O. Rutherford (Chairman), The B. F. Goodrich Co., Akron, Ohio; F. R. Henderson, F. R. Henderson & Co., 111 Broadway, New York, N. Y.; G. B. Hodgman, Hodgman Rubber Company, 25 W. 43rd street, New York, N. Y.

Banquet Committee

H. T. Dunn, The Fisk Rubber Co., 250 W. 57th street, New York, N. Y.; B. G. Work, The B. F. Goodrich Co., 1780 Broadway, New York, N. Y.; H. E. Sawyer, United States Rubber Co., 1790 Broadway, New York, N. Y.

Outing Committee

F. M. Hoblitt (Chairman), Ajax Rubber Co., Inc., 220 W. 57th street, New York, N. Y.; F. R. Henderson, F. R. Henderson & Co., 111 Broadway, New York, N. Y.; F. C. Millhoff, Miller Rubber Co., Akron, Ohio.

Arbitration Committee

Terms Expire 1926

H. H. Henderson, F. R. Henderson & Co., 111 Broadway, New York, N. Y.; J. H. Kelly, Hewitt Rubber Company, Buffalo, New York; J. T. Johnstone, J. T. Johnstone & Co., Inc., 22 William street, New York, N. Y.

Terms Expire 1925

S. G. Carkhuff, Firestone Tire & Rubber Co., Akron, Ohio; W. E. Bruyn, L. Littlejohn & Co., 133 Front street, New York, N. Y.

Terms Expire 1924

A. A. Garthwaite, Lee Tire & Rubber Co., 245 W. 55th street, New York, N. Y.; G. A. Ludington, The Fisk Rubber Co., New York, N. Y.

Statistics Compiled from Questionnaire Covering Second Six Months of 1922[1]

	Reported by Manufacturers Who Also Reclaim (30) Pounds	Reported by Reclaimers Solely (6) Pounds	Total Pounds
Reclaimed rubber produced from raw and cured scrap	22,952,912	39,686,261	62,639,173
Scrap rubber (including raw and cured scrap) consumed in production of reclaimed rubber	31,059,763	45,257,877	76,317,640

NUMBER OF POUNDS OF CRUDE RUBBER CONSUMED IN THE MANUFACTURE OF RUBBER PRODUCTS AND TOTAL SALES VALUE OF SHIPMENTS OF MANUFACTURED RUBBER PRODUCTS

Product	Number of Pounds of Crude Rubber Used	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and tire sundries:		
Automobile and motor truck pneumatic casings	177,668,194	$230,380,839
Automobile and motor truck pneumatic tubes	47,086,037	36,647,045
Motorcycle tires (casings and tubes)	462,522	795,121
Bicycle tires (single tubes, casings and tubes)	1,625,879	1,763,879
All other pneumatic casings and tubes, not elsewhere specified	21,690	484,351
Solid tires for motor vehicles	24,929,437	16,744,057
All other solid tires	300,277	454,326
Tire sundries and repair materials	2,623,870	5,464,254
Totals—Tires and tire sundries	254,117,906	$292,733,873
Other rubber products:		
Mechanical rubber goods	19,152,183	36,609,036
Boots and shoes	14,390,416	63,295,472
Insulated wire and insulating compounds	2,780,601	14,649,875
Druggists' sundries, medical and surgical rubber goods	2,787,678	6,484,900
Waterproof cloth, clothing, and rubber sheeting	3,722,457	9,841,162
Hard rubber goods	2,982,030	5,099,916
Heels and soles	6,602,287	9,641,813
Miscellaneous, not included in above items	6,081,856	8,637,956
Totals—Other rubber products	58,499,508	154,260,140
Grand total—All products	312,617,414	$446,994,013

INVENTORY OF CRUDE RUBBER IN THE UNITED STATES AND AFLOAT FOR U. S. PORTS, DECEMBER 31, 1922

On Hand	Long Tons: Plantation	Pará	All Other
Manufacturers	66,117	4,093	1,684
Importers and dealers	16,750	955	160
Totals	82,867	5,048	1,844

Grand total—On hand, 89,759.

Afloat	Long Tons: Plantation	Pará	All Other
Manufacturers	10,807	184	.....
Importers and dealers	33,558	906	325
Totals	44,365	1,090	325

Grand total—Afloat, 45,780.

[1]Number of rubber manufacturers that reported data was 260; crude rubber importers and dealers, 37; reclaimers (solely), 6; total daily average number of employes on basis of third week of July, 1922, was 146,330. This data represents approximately 90 per cent of the United States rubber industry.

New Goods and Specialties

Rubber Washboard Erases Dirt

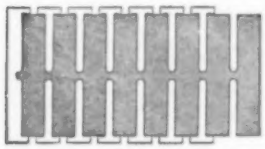
A REAL rubber novelty which will interest the hardware dealer particularly is a recently marketed rubber washboard. It is called the "Rub-less," to indicate that the hard work of rubbing clothes clean is eliminated. The idea is that the rubber simply erases the dirt from the clothes, just as easily and effectively as rubber erases penciling or smudges from paper.

A rubbing surface of thick, heavy, fine-toothed rubber, molded in one piece, has strips across its back which fasten into a stout wooden frame of ordinary washboard construction. The rubber, while extra tough, is soft and velvety so that neither the hands nor the most delicate fabrics are hurt or roughened. Soap lathers on it quickly and easily and the suds do not immediately run off as they do from the surface of the ordinary metal washboard.—Federal Rubber Goods Co., Akron, Ohio.

Rubber Washboard

New Puncture-Proof Reliner

The question of getting 100 per cent of wear out of a tire seems to be answered in the puncture-proof reliner. The accompanying illustrations show the construction of a practical reliner and how it is installed in the tire. This one, the Chicago Safety Reliner, is composed of two plates of polished corrugated steel with a layer of rubber between the plates and two plies of rubber on the outside, completely inclosing them separately in a flexible cushion of pure Pará rubber.



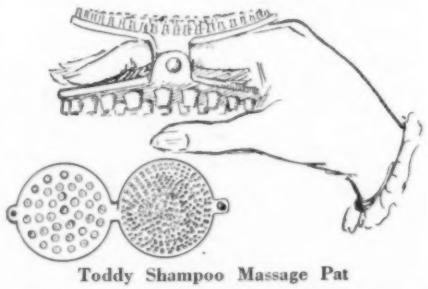
Overlapping Strips of Corrugated Steel

The strips of steel are ⅜-inch wide and from 1¾ to 3 inches long, according to the width of the tire. The edges of the strips overlap about ⅛ inch, making the two plates practically impenetrable. The open space is provided so that through vulcanization the three layers of rubber and the steel strips may be united into one solid mass. A special composition of graphite is used to finish the reliner inside and out, to prevent friction of reliner, casing, and inner tube. One of these reliners may be used in several different tires, protecting the new and almost doubling the life of the old, it is claimed, and one reliner will outwear several tires.—S. A. Rouse, 76 East 31st street, Chicago, Illinois.

Chicago Safety Reliner Installed in a Tire Minus the Inner Tube

Double Massage Pat of Rubber

A recent addition to druggists' rubber sundries is the double massage pat shown in the illustration. One of its sections is closely set with small suction cups and the other with a larger size, and the pat may be used either for massage or for shampoo. It fits over the hand in such a way as to be used in almost any position of the hand and leaves the thumb free to furnish a grip. It is made of pure gum Ceylon rubber, hygienically treated and sterilized.—Toddy Rubber Manufacturing Co., New York, N. Y.



Toddy Shampoo Massage Pat

Skeleton Golf Balls for Practice

Sporting goods dealers, who know that golf enthusiasts will welcome anything to improve their game, will be interested in this new practice ball, which is extremely light in weight and inexpensive. It is made of soft rubber, is hollow, and has a number of holes in it so that when struck full force it merely collapses, or travels but a negligible distance at most. It can be used in the house without danger of damage to furniture.—Paramount Rubber Consolidated, Inc., Little Falls, New Jersey.

Soft Rubber Practice Ball

Flush-Box Ball of Live Rubber

The extensive advertising which this new type of tank bulb is receiving will no doubt put it in the "best seller" class in plumbers' supplies. It is made of a single piece of pure, live gum, reinforced at the seating point and shaped like an inverted mushroom. When it fits down into any valve seat it is doubly held there, by the suction from below and by the pressure of the water above on the outstanding lip. It is practically indestructible and is not affected by water chemicals or rough usage. It cannot swell, collapse or stretch. It is made in three sizes, one of which fits any valve, and it is supplied only to master plumbers.—Woodward-Wanger Co., Philadelphia, Pennsylvania.

Mushroom Parabal Bulb

THE PRODUCT OF THE MILBURN PUNCTURE-PROOF TUBE CO., Chicago, Illinois, is said to have passed some remarkable tests to prove its quality and dependability. This tube is made of best plantation rubber, built up in sheets or layers under a special vulcanizing and welding process. A special patented treatment of the inside lining is designed to give added life and increased elasticity to the rubber.

Colored Crêpe Rubber Soles

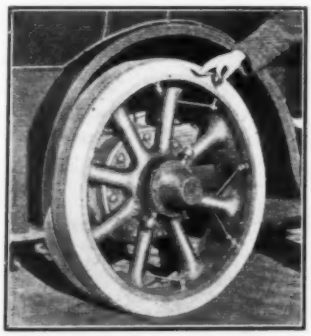
A new form of uncured rubber, specially colored and prepared for soles, is being offered to the shoe trade, in six different colors, as compressed sheets finely crêped on both sides.

The dimensions are 9 by 26 inches, ⅛, ¼, and ⅜ inches thick. The trim after cutting the soles is available as crude rubber for remilling into new sheets. The remilling in no way affects either the original colors or the vulcanizing properties of the stock. The colors are ordinary coal tar synthetic colors mixed with the liquid latex and permeate the rubber throughout.—J. T. Johnstone & Co., Inc., 16 William street, New York, N. Y.

Splash Guard for Automobile Wheels

A rubber wheel guard that is said to positively prevent splashing on muddy roads is shown in the accompanying illustration.

The device consists of a rubber ring formed in six sectors which slip into a groove around the circumference of a ring flange. The latter is attached to the inside of the wheel rim and is provided with a flange which fits closely against the edge of the steel tire band. The ring is secured in position by eight set screws, bearing in depressions in the wheel rim, lock-nutted and connected in pairs by steel bars passing around the wheel spokes, thus insuring secure attachment and easy removal.



N. & E. Splash Guard

The rubber splash ring stands away from the side of the tire. At intervals around the inner side of the rubber ring are T section splash breakers, the projecting webs of which prevent the mud being carried round by the wheel.—David Bridge & Co., Limited, Castleton, Manchester, England.

New British Cord Tire

The "Spenwood"

The "Spenwood," a new design in pneumatic cord tires, has as its special feature a black rubber tire base with the design raised and figured to resemble a series of dumbbells. It claims to have perfect balance, the cord casing having the same long life as the tough tread, which is particularly durable. The result of this design is to give increased tractive effect and a better road grip, as well as better brake action and control. The raised dumbbell design, being so pronounced in type, does much toward preserving or lengthening the life of the tire through making the danger of puncture negligible as well as through providing for it practical non-skid advantages.

This is an addition of the manufacturers to their already well-known three-ribbed type in cord fabric.—Wood-Milne, Limited, 3 Central Buildings, Westminster, London, S. W. I., England.

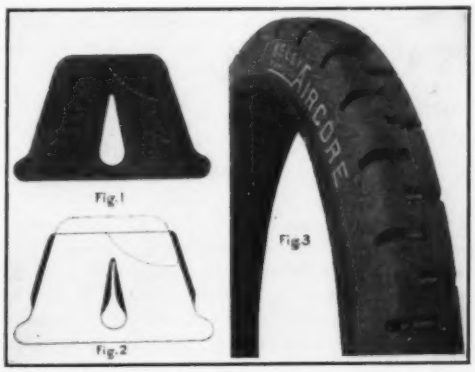
New Valve Fishing Tool

Every truck owner or driver will appreciate the simplicity and efficiency of the valve fishing tool shown in the illustration. It is designed to eliminate the trouble usually experienced in getting the valve stem through the opening in the tire rim when a pneumatic truck tire is being changed. With this tool the operation is accomplished without a minute's loss of time. After the tube is inserted in the casing the device is attached to the valve stem and the crossbar is dropped through the rim to draw the valve into position.—A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, New York.

Schrader Universal Valve Fishing Tool

New Cushion Tire for Trucks

The Kelly-Springfield Tire Co. has added to its line a new cushion truck tire, quite similar in appearance to their "caterpillar" tire but differing in the points brought out in Figs. 1 and 2 of the illustration. In Fig. 1 is shown the annular hollow or air space, approximately triangular in shape, which extends around the entire circumference of the inner portion of the tire and gives it its name, "the Aircore." This hollow core, together with transverse notches extending from each side of a point beyond the center of the walls of the tread and staggered alternately right and left, provides for displacement under compression, as shown in Fig. 2. The solid black indicates the position of the rubber when it is squeezed outward and into the central core, under a load. In Fig. 3 notice the pebble ejectors in the staggered notches, in the form of step-like rubber lugs, which get rid of any caked mud or stones that may lodge in the notches.



External and Sectional Views of the Aircore

The Aircore is specially designed to prevent acute bending of the side walls and to insure quick recovery of the rubber to its normal shape after deflection. It is intended for use on front wheels of all except the heaviest trucks, and on rear wheels wherever high speed and resiliency are demanded. The sizes include 34 by 4, 40 by 8, and 36 by 10.—Kelly-Springfield Tire Co., Akron, Ohio.

Dainty and Practical Rubber Aprons

New models of rubber aprons for various purposes are being offered by the United States Rubber Co., 1790 Broadway, New York, N. Y.; by the B & M Specialty Co., 1457 Broadway, New York, N. Y.; and by The Brooklyn Shield & Rubber Co., 397 Sumner avenue, Brooklyn, New York. The aprons are of high grade sheet rubber in bright colors trimmed with straps and plain or frilled edges of white or contrasting color. Some have pockets or applied rubber trimming.

An Addition to the Mark Twain Line

Hannibal "Right Size" Cord

The Hannibal "Right Size" Cord, shown in the illustration, is an addition to the line handled by the Mark Twain dealers. It is all black and is of the same size as other oversize fabric casings, 30 by 3½, which makes interchanging possible. The tough black tread extends to the beads and protects the side-walls against rut wear. The ribs of the non-skid design extend well down the sides, giving further side-wall protection in ruts and against curb abrasion.—Hannibal Rubber Co., Inc., Hannibal, Missouri.

"Stag Solid Pneumatic"

A tire recently produced and known as the "Stag Solid Pneumatic," for trucks, has a solid base in full contact with the wheel rim at every point, this feature being made possible by the introduction of an endless steel ring expanded into the base beneath the air chamber. Another important characteristic of this new type is its stud tread, especially designed to avoid skidding, while the tire as a whole is so constructed that it will fit any truck equipped with the ordinary solid tire.—Republic Rubber Co., Youngstown, Ohio.

More Bathtub Dolls

Among the new dolls are two of white rubber, dyed out and printed with the features, details of dress, etc., in colors. The clown is the favorite character and one made by The Brooklyn Shield & Rubber Co., 397 Sumner avenue, Brooklyn, New York, is stuffed with soft filling. Another one, inflatable, made by The Miller Rubber Co., Akron, Ohio, has the rubber extended at the top to form the pointed cap, and through the tip is inserted a short piece of rubber tubing to serve as mouthpiece. A tiny rubber band retains the air.

Completing the Miller Line

Under the general name of "Geared-to-the-Road," the manufacturer of the tires illustrated here has completed the line by adding the "Rellim" fabric tire and the "Wedge Tread" cord. The "Rellim" fabric tire was produced to meet the demand for a quality tire at a low price. The tread is semi-flat to give maximum traction, deep cut flanges hold the road, and a tough black tread and black tread stock side-wall guard against rut chafing. The "Wedge Tread" cord tire is oversize and has deep non-skid depressions, wedge-shaped, as the feature of the tread.—The Miller Rubber Co., Akron, Ohio.

"Rellim" Fabric Tire

"Wedge Tread" Cord

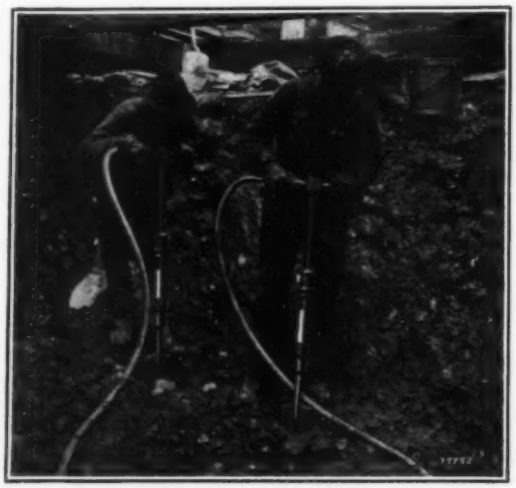
Automatic Windshield Wiper

The automatic windshield wiper illustrated here is operated by means of a small vacuum pump connected with the vacuum tank or intake pipe by flexible rubber tubing, and its speed is adjusted to the convenience of the driver by means of a small regulating screw. Installation may be made on any type of car by merely drilling three small holes in the frame of the windshield and inserting the screws provided with the outfit.—Thorn Machine Tool Works, Syracuse, New York.

Thorn Automatic Windshield Wiper

Pneumatic Clay Digger Requires Rubber Hose

Air-operated tools are taking the place of hand tools in many departments of mechanical work. The pneumatic clag digger shown in the illustration makes it possible for one man to do the work of five in digging trenches, sinking shafts, opening cuts for mains, etc. It is an air hammer with cross-bar extension handle and a digging blade which is held in the nozzle end of the hammer by a retaining device. The throttle which controls the operation of the tool is located in the grip handle so that the air can be shut off almost automatically by the operator as the tool is lifted from one position to another. A buffer is provided inside the retaining nozzle to take up the blow if the tool should be run accidentally. The amount of pneumatic hose required is, of course, governed by the job and location.—Ingersoll-Rand Co., 11 Broadway, New York, N. Y.



"Little David" Pneumatic Clay Diggers

THE NEW SPECIAL MODEL OF VACUUM CLEANER MANUFACTURED by The Hoover Co., North Canton, Ohio, operates electrically with a round rubber driving belt, has a strip of soft rubber around the outside to protect furniture, and has the wheels and long tube handle made of hard plastic composition.

A CHAIN OF SELF-SERVICE RESTAURANTS HAS APPLIED A THICK disk of rubberized fabric to the bottoms of its salt and pepper shakers in the effort to minimize breakage.

The Editor's Book Table

Book Reviews

"SYNTHETIC RESINS AND THEIR PLASTICS." BY CARLETON Ellis. 1923, New York, The Chemical Catalog Co., Inc., Cloth, 6 by 9 inches, 514 pages, indexed.

THIS book of 27 chapters is thoroughly scientific and technical. It represents a vast amount of research and presents the subject up to date in compact form for the chemist and technologist. The scope of the work is best indicated by the chapter headings, which are as follows: (1) Need for Synthetic Resins and Types Desired; (2) Cumaron and Indene Resins; (3) Commercial Grades of Cumaron Resin, Their Uses and Identification; (4) Modern Methods of Producing Cumaron Resin; (5) Resins from Petroleum, Polymerization of Certain Unsaturated Hydrocarbons; (6) The Resinous Condensation Products of Phenols and Aldehydes; (7) and (8) Phenol Formaldehyde Resins; (9) Applications of Phenol-Formaldehyde Resins; (10) Aldehyde Resins; (11) Furfural Resins; (12) Ketone Resins; (13) Urea and Thiourea Resins; (14) Resins from Wood and Wood Distillates (15) Hardened Resin and Resinates; (16) Ester Gums, or Artificial Resin Esters; Spar Varnishes; (17) Resins from Polybasic Acids and Polyhydric Alcohols, Glycerol Polybasic Acid Resins; (18) Polymerization of Vinyl Compounds. Effect of Substitution in the Ethylene Group; (19) Sulphur Resins; (20) Nitro Resins; (21) Halogenated Rubber; Chlorinated Rubber Solutions; (22) Miscellaneous Resins; (23) Certain Resinous Products Derived from Fatty Oils; (24) Preparation and Properties of Plastic Molding Compounds; (25) Equipment for Molding Plastic Compositions; (26) Methods of Molding; (27) Tests of Quality of Molded Articles.

"FACTS AFFECTING THE IMPORTATION OF RUBBER PRODUCTS into Cuba." Separate monograph prepared by the Rubber Division, Department of Commerce, P. L. Palmerton, chief. Published by Bureau of Foreign and Domestic Commerce, Washington, D. C. Paper, 8 by 9 inches.

Many interesting items regarding Cuba as one of our leading markets for rubber goods appear in this monograph, including some valuable statistics. These show the great increase here in our rubber goods trade, as indicated by the fact that the value of shipments to Cuba in 1913 represented 3.2 per cent of total United States exports of rubber manufactures; 1916, 3.5 per cent; 1919, 6.4 per cent; and 1922, 7 per cent.

"GLUE AND GELATIN." BY JEROME ALEXANDER. THE CHEMical Catalog Co., Inc., New York, N. Y. Cloth, 236 pages, 6 by 9 inches, appendix and index.

In the latest of the American Chemical Society Monograph Series, glue and gelatin are discussed by a recognized authority on the subject. Among the topics covered are the nature, structure and chemistry of glue, its technology, use and methods of tests.

"INDEX TO PROCEEDINGS, 1913-1920," AMERICAN SOCIETY FOR Testing Materials, Philadelphia, Pennsylvania, 1923. Cloth, 189 pages, 6 by 9 inches.

The index covers the contents of Volumes XIII to XX, inclusive, 1913-1920, of the Proceedings of the American Society for Testing Materials. The book comprises an index of key words in subject index, subject index and author index followed by table of contents of Proceedings.

"TENTH ANNIVERSARY BLUE BOOK, 1913-1923." PUBLISHED BY the National Association of Waste Material Dealers, Inc., Times Building, New York, N. Y. Cloth, illustrated, 268 pages, 6 by 9 inches.

In celebrating the tenth anniversary of the founding of their organization the executives of the Waste Material Dealers' Association have prepared their "Blue Book," which well illustrates the development of their enterprise from small beginnings. In this publication the names of members are not only listed alphabetically but are also classified in groups according to the various industries with which they are connected. Under the division devoted to rubber are given in full the specifications regarding scrap rubber and its packing as prepared by the Rubber Reclaimers' Division, Rubber Association of America.

New Trade Publications

"TYPE OD SAFETY-FIRST FUSE BOX" IS THE SUBJECT OF Leaflet 20,005 just printed by the Westinghouse Electric & Manufacturing Co., at East Pittsburgh, Pennsylvania. This fuse box is for use on circuit one to 100 amperes and 75 volts.

"COTTON YARN FACTS," PUBLISHED BY HENRY L. SCOTT & CO., Blackstone and Culver Streets, Providence, Rhode Island, manufacturers of rubber and fabric testing machines, contains illustrations of the company's machines, also some facts regarding the effect of moisture in cotton yarn manufacture, and among other tables one showing corrected tensile strengths of tire fabric at various moisture regains.

THE VERY FULL LINE OF RUBBER GOODS SOLD BY THE RELIANCE Rubber Co., Limited, 212-213 Upper Thames street, London, E. C. 4, England, is set forth in this company's latest catalog, entitled "Rubberware—The Complete Wholesale Rubber Goods Guide," the most complete catalog of rubber sundries that has yet been published in Great Britain.

Many illustrations add to the attractiveness of this booklet issued by a long-established organization, while the fact that rubber latex paper has been used throughout constitutes a feature of additional interest.

A NEW AND FULLY ILLUSTRATED CATALOG ENTITLED "RAND RUBber Goods—'They Last Longer'" is being sent out by the Brooklyn Shield and Rubber Co., Brooklyn, New York, manufacturer of various rubber goods for infants and other sanitary rubber requisites, bathing caps, etc. The company also supplies manufacturers with gum stock both in sheets and cut to specified individual patterns.

Abstracts of Recent Rubber Articles

Poisoning by Benzo-Carbon Tetrachloride Rubber Cement, with Special Reference to the Early Symptoms of Benzol Poisoning. Non-inflammable solutions of rubber in a mixture of benzene and carbon tetrachloride are extensively used in making millinery. Using a solution of rubber (about 3 per cent by weight) in a mixture of about 2 parts of carbon tetrachloride with 1 part of benzene, a number of women suffered poisoning. The benzene was the main cause of the trouble, although the carbon tetrachloride may have contributed to the somewhat complex symptoms. A limit of 1 part of benzene vapor to 100,000 of air is regarded as an advisable maximum. Women are more susceptible than men to benzene poisoning, the early symptoms of which are irritation of the mucous membrane of the upper respiratory tract, nausea, vomiting, burning sensation in the epigastrium, frequent urination, giddiness, slight air hunger, and weakness. A recommendation is made that all containers holding benzene should have a label impressing the importance of adequate ventilation in places where benzene is used. A bibliography is given of the effects of benzene and of carbon tetrachloride on the human system.—E. B. Starr, *Journal of Industrial Hygiene*, 1922, **4**, 203-211.

Electro-Deposition of Iron on Rubber. Results were obtained from a bath made up from a saturated solution (at 30 degrees C.) of equal parts of ferrous chloride and calcium chloride to which was added about 20 g. of chromous chloride and about 5 g. of quinol per liter. The optimum working temperature of the bath was 60 degrees to 70 degrees C., and the permissible quantity of ferric iron is probably less than 0.1 g. per liter. The quinol and its oxidation products will remain in the solution for long periods, but no satisfactory results can be obtained if the anode corrosion efficiency falls below 95 per cent. Chromium appeared to be plated out slowly, probably breaking up the iron crystal structure in a way similar to nickel in copper deposits. Control of the acidity of the bath is not so important as the regulation of the reduction of the plating solution.—H. D. Hineline. *Transactions of the American Electrochemical Society*, 1923, 21-27.

A Review of Solvent Recovery Processes. Solvent recovery processes as applied to trades other than the rubber industry are reviewed, followed by description of proposed and demonstrated methods as applied in rubber making, concluding with the details of the latest successful process.—J. H. Wild before the Institution of Rubber Industry, Manchester Section, February 19, 1923. *The India Rubber Journal*, February 24, 1923.

The Aging of Rubber. Aging of rubber as affected by oxidation and light. Discussion of methods of aging, changes of coefficient during aging and aging in the presence of accelerators.—S. A. Brazier. *The India Rubber Journal*, February 3, 1923, 9-15.

Rubber as Applied to Aircraft. Lecture before the Institution of Rubber Industry, London, October 2, 1922, followed by discussion.—James Dyer. *The India Rubber Journal*, October 7, 1922.

The Chemistry of Rubber. Report of a lecture by Dr. G. S. Whitby, before the Montreal Section of the Canadian Institute of Chemistry, March 19, 1923. An account of the investigations now being made by Dr. Whitby on rubber resins and his theory that the action of vulcanization ultra-accelerators which are strong bases, such as piperidine and its derivatives, is due to the neutralization of the free acid of the resins, with formation of corresponding soaps.—*Canadian Chemistry and Metallurgy*, April, 1923, 100.

Some Mechanical Problems in the Rubber Industry. A general discussion of the problems of factory design, power, water supply, heating and ventilation, dust removal, piping and electric power systems. Rubber washing and drying operations. Paper read before the Institution of Mechanical Engineers by H. C. Young. *The India Rubber Journal*, March 3, 10, 17, 24, 31, 1923.

The Harvesting and Preparation of Leaf Gutta. Descriptive of factory methods of extracting gutta from leaves, bark and twigs. —H. Van Lennap. *The India Rubber Journal*, February 17 and March 3, 1923.

Kirchhof's Recent Investigations on the Constitution of Types of Rubber. The results of Pummer and Burkard are sufficient evidence to prove that rubber has the empirical formula $(C_5H_8)x$ and not $C_{10}H_{17}$ according to the contention of Kirchhof. —Walter Herzog. *Oesterreichische Chemiker Zeitung* 25, 157, 1922.

Rubber. A study of the structure of the rubber molecule by means of its hydrogenation and oxidation resulting in assigning $(C_5H_8)x$ as the empirical formula for rubber.—Rudolf Pummer and Peter A. Burkard. *Berichte der Deutschen Chemischen Gesellschaft*, 55, 3458-72, 1922.

Possibilities of Rubber Latex. Results obtained in using latex in the manufacture of paper for special purposes, cotton sizing, cloth finishing, water proofing, etc.—J. A. Hunter. *Textile World*, 62, 3014-7, 1922.

The Coagulation of Latex. The effect of calcium chloride in increasing the weight of the coagulum obtained is due to its precipitating from the serum phosphates and citrates which have the ability to hold part of the milk proteins in solution.—H. Lindet. *Comptes Rendu*, 175, 798-9, 1922.

Experiments with Rubber, Celluloid and Hexalin. Celluloid solutions in amyl acetate and rubber solutions in benzine are easily miscible without subsequent separation by addition of 0.2 of the total volume of hexalin at room temperature. By varying the percentages of rubber and celluloid clear products of good tensile strength were obtained, but were very slow in drying. The solution is suggested for use both in the plastic state and for making dipped goods, for even under very unfavorable conditions a high gloss can be obtained.—Fordyce Jones, *Rubber Age*, London 12, 205, 1922.

The Manufacture of Golden Antimony Sulphides. An outline of the chemistry of large scale manufacture supplemented by a description of the results attainable with these pigments in rubber compounds.—Giro Silvio. *Le Caoutchouc et la Gutta Percha* 19, 11640-1, 1922.

The Manufacture of Carbon Blacks in France in Relation to that of Rubber. M. Oswald. *Le Caoutchouc et la Gutta Percha* 19, 11641-4, 1922.

Dithio-Acids and Their Derivations as Ultra-Accelerators of Vulcanization. G. Bruni, *The India Rubber Journal* 64, 937, 1922.

The action in the Vulcanization of Rubber of homo- and heterocyclic dithio acids and their Derivatives, and of Nitrogen Sulphide.—E. Romani. *Le Caoutchouc et la Gutta Percha* 19, 11626-9, 1922.

The Use of Hard Rubber in Chemical Industry. General account.—Anonymous. *Chemical Age*, March, 1923.

Manufacture of Lithopone. Account of improved method of making lithopone based on the researches of Bryer and Farber.—Anonymous. *Chemical Age*, March, 1923.

Some Notes on Calender Grain. Account of temperature-retraction experiments on grain effects.—R. W. Lunn. *The India Rubber Journal*, April 7, 1923, 7-8.

Telegraph Cable Manufacture, Rubber and Gutta Percha. Comprehensive general account of submarine cable making read before the Institution of Rubber Industry, March 5, 1923.—H. Savage. *The India Rubber Journal*, March 24, 1923, 15-18.

Some Theories Regarding the Action of Accelerators During Vulcanization. Comprehensive summary and discussion of the present state of the subject supplemented with numerous references.—F. Thomas. *The India Rubber Journal*, March 31, 1923, 13-16.

The Vulcanization of Rubber. Cantor Lecture I, the Royal Society of Arts.—H. P. Stevens. *The Rubber Age*, London, April, 1923, 87-94.

What Can Be Done in Rubber Research? Important problems outlined and discussed.—B. D. Porritt. *The Rubber Age*, London, April, 1923, 105-113.

DEVELOPMENTS IN CARDED YARN TRADE

For the first time since the general industrial slump of 1920 there have been, in the early part of March, substantial contracts placed for 23s carded tire yarns. While it is impossible to predict future developments in this matter, and even if the estimates of 3,000,000 new automobiles for 1923 and 50,000,000 tires prove to be too large, there will still remain a potential demand for yarn and raw cotton in proportions of importance. Notwithstanding the tightly sold condition of coarse count weaving yarns, these new contracts for 23s carded tire yarns have been placed within 5 per cent of minimum prices ruling in December. With developing business the combed yarn division of the market may greatly improve, the fact remaining, however, that the tire cloth trade is now utilizing short cottons to a greater or less extent, instead of the long staples formerly considered necessary, and used exclusively.

News of the American Rubber Trade

Financial

Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Allis-Chalmers Mfg. Co.	Com.	$1.00	May 15	Apr. 24
Brunswick-Balke-Collender Co.	Com.	1¼% q.	May 15	May 5
Goodrich, B. F., Co.	Pfd.	1.75 q.	July 2	June 21
Hood Rubber Co.	Pfd.	1¾%	May 1	Apr. 20
Kelly-Springfield Tire Co.	8% Pfd.	$2.00 q.	May 15	May 1
Firestone Tire & Rubber Co.	7% Pfd.	1¾%	May 15	May 1
Lee Rubber & Tire Corp.	....	50 cts. q.	June 1	May 15
Mason Tire & Rubber Co.	Pfd.	1¾% q.	Apr. 25	Mar. 31
New Jersey Zinc Co.	....	2% q.	May 10	Apr. 30
United States Rubber Co.	1st Pfd.	2% q.	Apr. 30	Apr. 16

New York Stock Exchange Quotations

April 25, 1923

	High	Low	Last
Fisk com.	13	12¾	12¾
Goodrich com.	37¼	37¼	37¼
Goodrich pfd.	90	90	90
Goodyear pfd.	62½	59¾	59½
Goodyear pr. pfd.	96⅝	96⅝	96⅜
Kelly-Springfield com.	58⅞	58⅛	58⅛
Lee com.	30⅛	30⅛	30⅛
United States Rubber com.	60¼	60	60½
United States Rubber pfd.	102⅛	102⅛	102⅛

Akron Rubber Stock Quotations

Quotations of April 24 supplied by App-Hillman Co., Akron, Ohio, were as follows:

	Last Sale	Bid	Asked
American com.	10	...	8
American pfd.	50	...	50
Amazon com.	2	2½	3½
Firestone com.	80	80	80½
Firestone 6% pfd.	97	97	98
Firestone 7% pfd.	97	97	97½
General com.	180	...	185
General 7% pfd.	99	98	100
Goodrich 6½'s	100⅞	100⅝	101¼
Goodyear com.	15⅛	14¾	15¼
Goodyear 7% pfd.	56	55½	57
Goodyear prior pfd.	96⅝	96⅝	97
Goodyear 1st mtg. 8's	117¼	117	117½
Goodyear deb. 8's	103¾	103½	104
India com.	95	90	93
India 7% pfd.	90	90	95
Mason com.	5¾	5¾	6¼
Mason 7% pfd.	39	38½	39½
Marathon	2½	2¾	3¼
Miller com.	91	90	93
Miller 8% pfd.	105	105	107
Mohawk com.	17	16	20
Mohawk 7% pfd.	65	63	67
Rubber Products	20	18	23
Seiberling com.	9½	9	9½
Seiberling 8% pfd.	67	65	68
Star com.	25	..	27
Star 8% pfd.	80	..	80

Supplemental Goodyear Statement

Since the annual statement of the Goodyear Tire & Rubber Co., Akron, Ohio, was issued covering the calendar year 1922, the company has considerably improved its financial situation.

Bonds and debentures aggregating $4,750,000 have now been retired. Prior preference stock listed in the balance sheet at $3,195,500 has been purchased and retired. A total of $14,902,500 worth of prior preference stock issued and outstanding has now been purchased and retired, reducing the balance outstanding to $15,000,000. As it was retired at a price less than par and the accrued interest thereon cancelled to January 1, 1923, the equities of preferred and common stock have now been increased by $4,280,360. Accrued dividends on prior preference stock have been declared and settled and the stock placed on a current dividend basis beginning April 1, 1923. Arrangements have been concluded for the surrender and cancellation of 50,000 shares of common stock.

The peak amount of bonds, debentures and prior preference stock issued as a result of the reorganization was $87,402,500. This has been reduced to a total of $72,750,000, or a reduction of $14,652,500. On March 15, 1924, it is expected to bring this down to $64,750,000, or a reduction from peak of $22,652,000, with a reduction of $1,212,000 in annual charges prior to preferred and common stocks.

Lee Rubber and Tire Corporation

The Lee Rubber & Tire Corporation and its subsidiaries sold more tires during 1922 than in any previous year in its history. Net sales for the year ended December 31, 1922, totalled $6,468,208 against $7,358,436 in 1921, but showed a net profit of $370,493 after charges and Federal taxes, equivalent to $2.47 a share on 150,000 shares of no-par common, against $9,238 or 6 cents a share in 1921. Deduction of dividends amounting to $300,000 left a surplus of $70,493, against a deficit of $290,762 in 1921. The company's total surplus at the end of last year was $431,089, and reserves $569,479. Current assets were $3,779,509 and current liabilities, $448,748, a relation of better than eight to one.

Miller Earns Three Millions

The net sales of the Miller Rubber Co., Akron, Ohio, for the fiscal year ended December 31, 1922, were $24,764,244, which is 130 per cent of net sales for the year 1921 of $18,983,677. Total inventories amounted to $6,128,074 as compared with $3,981,922 at the end of the previous year. Raw materials and in process were taken at cost or market, whichever was lower. After a liberal allowance for depreciation, obsolescence and interest charges, the net earnings, before provision for Federal taxes, were $3,116,607.

The regular quarterly preferred dividends of 2 per cent were paid in September and December, 1922, and on the same dates an additional 1 per cent was paid to apply on the deferred dividends. A like dividend was paid March 1, 1923, and the company has during the year purchased in the market for retirement the amount of preferred stock it was required to retire for the years 1921 and 1922.

New Incorporations

American Cactus Rubber Products Co., April 19 (Delaware), $500,000. M. M. Lucey; M. B. Reese; L. C. Browne, all of Wilmington, Delaware. Delaware agent, Colonial Charter Company, 927 Market street, Wilmington, Delaware. To deal in rubber and rubber compounds of all kinds.

Ashland Tire & Rubber Co., The, March 20 (Ohio), $300,000. C. D. Darrah; S. H. Grabill; G. E. Brown; J. E. Mayner; R. W. Topping. Principal office, Ashland, Ohio. To manufacture rubber products.

Auerbach Tire Works, Inc., April 9 (New York), $10,000. M. Weinberger, 1223 Bushwick avenue; C. Auerbach, 976 Bushwick avenue; W. Auerbach, 252 Greene avenue, all of Brooklyn, New York. Principal office, Brooklyn, New York. To manufacture and deal in tires.

Byrne & Co., J. P., Inc., April 2 (New York), $10,000. J. P. Byrne; R. L. Caldwell; B. E. Shove, all of Syracuse, New York. Principal office, Syracuse, New York. To manufacture auto tires.

C. & K. Tire Protector Co., Inc., March 28 (New York), $2,500. L. R. Caragol, 95 Vilet avenue, Floral Park, New York; F. W. Krausi, 1051 Lincoln Place, Brooklyn, New York; C. M. Lawless, 320 Broadway, New York City. Principal office, Brooklyn, New York. To deal in tires and accessories.

Cincinnati Rebuilt Tire Co., The, March 13 (Ohio), $10,000. J. W. and V. M. Knobloch; J. and F. M. Greenfield. Principal office, 315 East 8th street, Cincinnati, Ohio. To rebuild tires, etc.

Co-Rim-Co Corporation, February 28 (Kentucky), $500,000. V. Lachemalle; F. E. Balcom; B. F. Hardesty, all of Louisville, Kentucky. Principal office, 206 Central avenue, Louisville, Kentucky. To manufacture collapsible rims for automobiles.

Delaware Tire & Rubber Company, April 4 (Delaware), $10,000. W. D. Pawley, 1201 French street; M. and A. P. Finger, all of Wilmington, Delaware. To manufacture and deal in tires and tubes for automobiles and vehicles of every kind.

Delbee Rubber & Supply Co., Inc., March 27 (New York), $10,000. F. W. Baldwin; B. E. Shove; R. M. Dusenberg, all of Syracuse, New York. Principal office, Syracuse, New York. To manufacture rubber goods.

Equitable Rubber Products Corporation, The, April 11 (Delaware), $2,000,000. M. L. Rogers; L. A. Irwin; W. C. Singer, all of Wilmington, Delaware. Delaware agent, Delaware Registration Trust Company, 100 West Tenth street, Wilmington, Delaware. To manufacture rubber products.

Fuhr-Barnes Manufacturing Co., March 13 (Delaware), $530,000. T. L. Croteau; M. A. Bruce; A. M. Hooven, all of Wilmington, Delaware. Delaware agent, Capital Trust Company of Delaware, Dover, Delaware. To manufacture and deal in automobile rims.

Gladstone Tyre & Rubber Co., Inc., April 9 (New York), $1,030. H. D.; W. H. and A. Gladstone, all of 411 West 51st street, New York City. To manufacture tires and rubber products.

Hexagon Tire Co., Inc., April 2 (New York), $500. E. Baumgarten, 1153 First avenue; I. E. Foley, 620 West 116th street; J. F. Crowley, 527 West 23rd street, all of New York City. To deal in tires.

Huffnagle, Inc., Harry W., March 9 (New Jersey), $100,000. H. W. Huffnagle, president; R. P. Read, secretary; C. P. Tilton, treasurer. Principal office, 510 Guarantee Trust Building, Atlantic City, New Jersey. To purchase, sell, lease or otherwise acquire and deal in solid, cushion and pneumatic tires.

Indiana Rubber Products Corporation, April 5 (Delaware), $10,000,000. C. H. McDermott; F. E. Teachout, both of Oak Park, Illinois; R. S. Cheney, Park Ridge, Illinois. Delaware agent, Capital Trust Company of Delaware, Dover, Delaware. To manufacture and deal in rubber, gutta percha, and all goods of which they are component parts.

Liberty Rubber Co., The, March 20 (Ohio), $30,000. F. Zacher; A. Tomeik; G. Hanzel; S. Hanic. Principal office, Barberton, Ohio. To manufacture rubber products.

Metropolitan Mileage Corporation, March 24 (New York), $500,000. R. Edelstein, 40 West 45th street; H. C. Neuwirth, 2030 Broadway; N. Spivack, 66 East 111th street, all of New York City. To manufacture automobile tires, etc.

Moes Tire Cave Co., The, March 29 (Ohio), $4,000. M. A. Salzman; H. J. Alferin; E. M. Mack; H. K. Spero. Principal office, Cleveland, Ohio. To deal in tires and tubes.

National Non-Skid Co., March 24 (Delaware), 5,000 shares without nominal or par value. T. L. Croteau; M. A. Bruce; A. M. Hooven, all of Wilmington, Delaware. Delaware agent, Corporation Trust Company of America, DuPont Building, Wilmington, Delaware. They are authorized to manufacture and deal in a device known as the "Non-Skid."

National Rim Corporation, April 17 (Delaware), $75,000. F. W. Watts, Washington, D. C.; I. H. Linton; W. H. Ronsaville, both of Kensington, Maryland. Delaware agent, Capital Trust Company of Delaware, Dover, Delaware. To manufacture, buy, sell and exchange automobile rims, and accessories.

New Pressman Tire & Rubber Co. ,The, March 23 (New Jersey), $2,000,000. H. Pressman, Ritz-Carlton, Philadelphia, Pennsylvania; J. E. Monteith, 16 Munn avenue, East Orange, New Jersey; H. G. Tully, Forest avenue, Glen Ridge, New Jersey. Principal office, 776 Broad street, Newark, New Jersey. To manufacture tires.

Northern Rubber Co., The, March 15 (Ohio), $250,000. L. W. Schott; R. W. Kent; A. I. Wheeler; P. A. Kuhn. Principal office, Akron, Ohio. To manufacture rubber products.

Pope Tire & Battery Co., March 6 (North Carolina), $100,000. W. L. Pope; J. L. Stevenson; L. O. Gibson; J. L. Milholland; C. Stimpson; C. H. Turner; C. C. Tharpe; D. L. Raymer, all of Statesville, North Carolina. Principal office, Statesville, North Carolina. To manufacture and repair automobile tires, tubes and batteries.

Reese, Inc., Gordon B., February 12 (Wisconsin), $25,000. J. S. Auer; E. A. and G. B. Reese. Principal office, Milwaukee, Wisconsin. To deal in tires, tubes, etc.

Regan, Inc., Lawrence P., March 28 (New York), $3,500. L. P. and M. Regan, both of 56 North 22nd street, Flushing, New York; E. V. Walter, 410 West 41st street, New York City. To manufacture automobile tires.

See-Kure Collapsible Rim Corporation, March 27 (New York), $10,000. L. B. Wishnevsky, 422 Lenox Road; C. Z. Wiener, 520 Lafayette avenue, both of Brooklyn, New York; F. M. Heyman, 1975 Creston avenue, New York City. Principal office, Brooklyn, New York. To deal in tires, automobile rims, etc.

Tire Carbon Co., March 28 (Delaware), $210,000. T. L. Croteau; M. A. Bruce; A. M. Hooven, all of Wilmington, Delaware. Delaware agent, Corporation Trust Company of America, DuPont Building, Wilmington, Delaware. To manufacture and deal in carbon and other compounds used in the manufacture of rubber tires, tubes, etc.

Tire Service Station, January 6 (West Virginia), $10,000. G. R. Cunningham, president; L. R. Talkingham, vice-president; J. B. Moore, secretary and treasurer. Principal office, 227 Jackson street, Fairmont, West Virginia. To deal in tires, tubes and accessories. Vulcanizing a specialty.

Weatherproof Garment Co., March 21 (Ohio), $60,000. G. G. Hornstein, president; R. O. Morgan, vice-president; J. E. Casey, secretary; J. Rose, treasurer and general manager. Principal office, Reignaway Building, Galion, Ohio. To manufacture wearing apparel, both from rubberized and unrubberized materials.

The Rubber Trade in the East and South

Manufactured Goods

Business is active in all divisions of the rubber trade in the east and south. The mills generally are well supplied with orders for weeks in advance. Manufacturers, however, are purchasing supplies cautiously and more for present than for future requirements. In some lines business is described as spotty due possibly to keen competition, notably in heels and tires. Freight movement in southern New England is considerably hampered, necessitating much of the supply of raw material to be sent from points south and west by water to Boston for distribution. In the case of factories not too far from New York, overland transportation of material by motor truck is resorted to, which is a serious handicap.

In the insulated wire trade, manufacturers of power cables are sold up on their product from eight to ten months in advance and in other insulation from six to ten weeks.

The past season for boots and shoes has been one of record consumption and the factories are at present working on full tickets, more especially on sport shoes and light weight goods. Heel output is in usual large volume, with sharp competition.

In mechanical lines belting and hose are active. In dolls, balls, and toys new methods have supplanted old. The former leading factor has definitely withdrawn from the production of these goods in favor of other lines. .

The manufacture of automobile topping is very active, to meet the demands of record production of automobiles.

U. S. Rubber Elects Executives

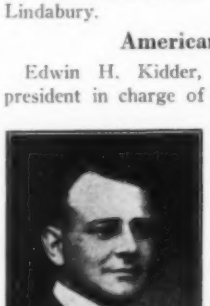
At the organization meeting of the Board of Directors of the United States Rubber Co., held April 19, the following elections and appointments were made for the ensuing year:

EXECUTIVE COMMITTEE: Charles B. Seger (Chairman), Lester Leland, James S. Alexander, Walter S. Ballou, Nicholas F. Brady, and James B. Ford.

OFFICERS: Chairman of the Board of Directors, Charles B. Seger; Vice Chairman of the Board of Directors, Lester Leland; President, Charles B. Seger; Vice Presidents, James B. Ford, Homer E. Sawyer, J. Newton Gunn, Ernest Hopkinson, H. Stuart Hotchkiss, Edward H. Hart, and W. G. Parsons; Second Vice Presidents, Charles J. Butler, Edward J. Coughlin, George H. Mayo, George S. Shugart, and Raymond S. Willis; Secretary, Samuel Norris; Treasurer, Wilson H. Blackwell; Comptroller, William O. Cutter; Assistant Secretary and Assistant Treasurer, John D. Carberry; Assistant Treasurers, Sherwood S. Green and H. H. Nance; Financial Manager of Sales, Henry B. Hubbard; General Purchasing Agent, William H. Marsh; General Traffic Manager, George F. Hichborn; Assistant Comptrollers, Harold B. Grouse, Earl D. Page, M. George Burnett, and Noble Ashley; Auditor, George E. Smith; General Attorney, Samuel Norris; Attorney, Kennedy M. Thompson; Assistant to the President, Eric C. Burkman; Transfer Clerk, John Bensinger; Secretary to the Chairman and President (Appointed by Mr. Seger), F. V. Glynn; General Counsel, John W. Davis; New Jersey Counsel, R. V. Lindabury.

American Dunlop Sales Manager

Edwin H. Kidder, who has recently been appointed vice president in charge of sales of the Dunlop Tire & Rubber Corporation of America, at Buffalo, New York, is widely known in automobile tire trade circles and well fitted by broad experience for the task upon which he has entered.



Edwin H. Kidder

Following his representation of one of the big tire concerns on the first Glidden tour in 1905, he became branch manager for the Continental Tire Co. at Boston, Massachusetts, and soon increased its business there greatly.

When the United States Tire Co. was organized he was given charge of its solid tire department, and his promotion to the management of the Boston branch followed in 1911 as the result of his assiduity and success in that position. Except for a short period during the war, when he served on the personnel board of the Emergency Fleet Corporation, Mr. Kidder has been in charge of the New England territory for twelve years, during which time he has made an enviable record and acquired a wide circle of friends.

Before his departure his Boston associates gave him a dinner at the Copley Plaza Hotel, when he was presented with a gold watch and chain as a token of their esteem.

Baird Rubber & Trading Co.'s Removal

On May 1 the Baird Rubber & Trading Co., Inc., will move from 9-15 Murray street to Rooms 2536, 2538 and 2540, Woolworth Building, 233 Broadway, New York City.

The company is an old and well established one. The founder, Robert B. Baird, has been associated with the rubber industry since 1885, beginning as cashier and bookkeeper for The New York & Boston Rubber Co., later acting as salesman for the New York Commercial Co., and George A. Alden & Co. of Boston. Leaving these firms he conducted under his own name a crude rubber business in Boston, at 67 Chauncy street.

In 1901 he opened offices at 253 Broadway, New York, N. Y., with Boston offices at 161 Summer street. In 1902 the business was removed to 38 Murray street, operations being carried on under the name of the Rubber Trading Co. In the same year William T. Baird, brother of Robert B. Baird, left the treasurership of the Mechanical Rubber Co. and The New York Belting & Packing Co. to become president of the Rubber Trading Co. In 1912 the company moved to 9-15 Murray street, at the same time taking the final name of the Baird Rubber & Trading Co., business continuing at that address up to the present time.

There are now included in the executive personnel Robert L. Baird, son of Robert B. Baird; Collier W. Baird and William T. Baird, Jr., sons of William T. Baird. With wide interests and extensive foreign connections, the company has every opportunity for still further enlarging its activities.

New York

The following have been recently elected officers of the Kelly-Springfield Tire Co., 250 West 57th street, New York, N. Y.:

President, A. L. Scheuer; first vice president, F. A. Seaman; vice presidents, C. A. Brown, Maurice Switzer, J. V. Mowe, and T. C. Marshall; secretary, C. P. Stewart-Sutherland; treasurer, H. B. Delapierre; auditor, M. C. Lachenbruch.

Charles E. Wood, Inc., crude rubber broker, announces the removal on April 9 of his offices from 287 Broadway to the Robinson Building, 6 Church street, New York, N. Y.

The R. S. Hardy Co., crude rubber brokers, and formerly at 66 Broad street, have recently removed to 44 Broad street, New York, N. Y.

S. S. Scudder, formerly one of the crude rubber brokerage firm known as Oliver, Keeler & Scudder, has announced his retirement from the organization, which will, however, continue business under the name of Oliver & Keeler. The company's offices are located at 24 Stone street, New York, N. Y.

Offices were opened on April 10, 1923, at 9 Hanover street, New York, N. Y., by the Holcombe Rubber Co., Inc., importers and dealers in crude rubber, balata, and kindred products.

The Smith Chemical & Color Co., 257-259 Water street, New York, N. Y., importers, exporters, and manufacturers of chemicals and colors, announce the addition to their sales force of A. W. Gay.

The Regina Swimming Devices Co., manufacturers of the Regina Swimming Floats and similar products, is in its new quarters at 29 East Twenty-first street, New York, N. Y., having removed from 102 Lexington avenue.

The Toddy Rubber Manufacturing Co., manufacturer of sanitary articles of rubber and rubberized materials, has moved from 98 Park Place to larger quarters at 153 Duane street.

Jenkins Bros., 80 White street, New York, N. Y., will build an addition to the company's Bridgeport, Connecticut, plant, where brass, iron, and steel valves are manufactured. A subsidiary organization is maintained at Montreal, Canada, while a third at Elizabeth, New Jersey, and known as the Jenkins Rubber Co., specializes in the production of composition valve seats, packing, and mechanical rubber goods. Officials of the company include: Farnham Yardley, president; Frank T. Swain, vice president; C. V. Barrington, vice president; W. Byron Rufe, secretary; and A. Eugene Brady, treasurer.

Frank Brothers Manufacturing Co., 53 East Ninth street, New York, N. Y., has purchased all the rubber goods, metal specialties and the patent rights on the molds of The Norwalk Manufacturing Co. and The Liberty Manufacturing Co. both of East Norwalk, Connecticut. Through this enlargement of its business the Frank organization will be enabled to continue its present line of rubber and metal specialties, but with manufacturing facilities greatly improved.

The Keller Mechanical Engineering Corporation has been recently established as successor to The Keller Mechanical Engraving Co., 70 Washington street, Brooklyn, New York, and will continue the building of die sinking and mold cutting machines and the production of dies and molds. No change is made in the organization's executive personnel, which remains as follows: Joseph F. Keller, president, in charge of works and development; Jules Dierckx, vice president, in charge of sales; Sidney A. Keller, treasurer; Laurence Arnold Tanzer, secretary and legal advisor; and Edward N. Anderson, assistant secretary and auditor.

Connecticut

The Omo Manufacturing Co., Middletown, Connecticut, manufacturers of dress shields, bias bindings, etc., has changed its New York sales office from 230 Fifth avenue to 1140 Broadway.

The Armstrong Rubber Co., Inc., Garfield, New Jersey, that recently purchased the plant of the West Haven Rubber Co., West Haven, Connecticut, has moved all its equipment to that factory, and will concentrate operations there. It is stated that production will soon reach 500 or 600 tires a day. E. O. Machlin has been placed in charge of sales of the company's "Connecticut Cord" tires.

Pennsylvania

Additional machinery is soon to be installed at the plant of the Cancos Manufacturing Co., Bridge and Garden streets, Philadelphia, Pennsylvania. The factory, where packings of every kind are produced, is now running at full capacity. George M. Costello is president.

On May 1 the Pittsburgh offices of The Cutler-Hammer Manufacturing Co., Milwaukee, Wisconsin, will be moved from the Farmers Bank Building to larger quarters in the Century Building, on Seventh street. A. G. Pierce, one of the company's district managers, has his headquarters in Pittsburgh.

Reiff & Co., Drexel Building, Philadelphia, Pennsylvania, specializing in chemicals, drugs, and raw materials, has been appointed sole American territorial agent for Philipp Bauer & Co., Germany, and its allied company, the N. V. Transatlantische Handel-Maatschappij, Germany and Holland. It is stated that the New York City firm trading under the name of Philipp Bauer & Co. has no connection whatever with Philipp Bauer & Co. of Germany.

The South

The Virginian Rubber Co., St. Albans, West Virginia, has recently increased its production and is now manufacturing 500 tires a day as well as making heavy gray tubes. The executive personnel of this organization includes the following:

F. R. Talbott, president and general manager; R. W. Lauer, vice president and factory manager; E. P. Stroman, treasurer; A. A. Lilly, secretary; B. F. Worrell, sales manager.

The Marshville Manufacturing Co., Marshville, North Carolina, has prepared plans and has purchased equipment for a new factory building, measuring 92 by 175 feet. The company, which expects to begin operations about the middle of August, will manufacture cord tire fabric and plans a weekly production of 25,000

pounds. S. M. Robinson is president, and H. B. Marsh, vice president.

The Knoxville Rubber Co., East Jackson avenue, Knoxville, Tennessee, has recently been installing machinery and equipment for the manufacture of automobile tires. Plans include the production of 100 casings a day. W. M. Simpson is manager.

The Rubber Trade in New Jersey

Manufactured Goods

New Jersey mechanical rubber goods factories continue to run full time and some of them overtime. The factories making lawn hose are swamped with business and are weeks behind on deliveries. Trenton tire factories are running at full capacity and report an active demand for their products. Labor is by no means as plentiful as the mills would like to see it, and with the advent of building operations, road building, and other outside work paying wages as high or higher than manufacturing plants, a shortage of labor is something which may materialize at any time. As mentioned last month the manufacturers of mechanical rubber goods do not hesitate to express regrets at having booked so much low priced business in the late summer and early fall of 1922 for delivery in the spring and summer of 1923. This question of advance booking of business is becoming a serious one because the business is taken under conditions which are far from reciprocal but on the contrary insure absolute protection for the buyer regardless of how the market values of raw material and labor may go.

Some of the tire manufacturers predict another increase in the price of tires to meet the advanced costs of raw material. The last increase averaged from 10 to 15 per cent and became effective April 1. The price advance has in no way influenced output; in fact, production has increased since March 1, when the first increase went into effect. Manufacturers are well pleased with the outlook for the coming year.

Rubber Manufacturers' Meeting

The regular meeting of the Rubber Manufacturers' Association of New Jersey was held on the evening of April 9 at the Stacy-Trent Hotel, Trenton. A full attendance enjoyed the occasion and listened to a very interesting address by A. L. Viles, general manager of the Rubber Association of America, Inc., regarding the crude rubber situation. It was unanimously agreed that an invitation should be extended to the Mechanical Rubber Goods Manufacturers' Division of the Rubber Association of America to attend an outing at the Trenton Country Club on Tuesday, May 8, as guests of the New Jersey Association.

Trenton

The Home Rubber Co. fortunately escaped serious fire last month. Some of the electric wiring in the engine room was injured in some manner causing fire to start in the woodwork, with the result that the entire interior of the engine room was burnt out or badly charred. Fortunately the engine was not seriously damaged, so that only a few days' delay in operations resulted.

The Woven Steel Hose & Rubber Co., under the able management of Horace B. Tobin is rapidly increasing its business and bids fair to soon become a leader in its special lines.

Louis P. Destribats, formerly factory manager of the Ajax Rubber Co.'s Trenton plant, has purchased a fine estate on the Rumson road in the northern resort portion of New Jersey. Mr. Destribats intends to take up his residence in northern Jersey very soon.

Many of Trenton's rubber manufacturers, executives, and others, participated in the annual invitation tournament of the Trenton Country Club last week and made very respectable showings. There is no other industry so strongly represented in golfing ability in our local Country Club.

Cook's Linoleum Co., one of the most important Trenton factories, controlled by G. R. Cook, who has been identified with the rubber business for almost a lifetime, changed hands on April 30. The plant was taken over by the Certain-Teed Products Co. Mr. Cook still retains his large interests in several local rubber factories and some elsewhere and will, no doubt, continue active in these enterprises.

The Essex Rubber Co. reports a continued full capacity business on its various lines and is seriously considering factory enlargement.

The Mercer Rubber Co. is running full capacity on lawn hose and rubber fruit jar rings. It is very favorably situated outside of Trenton in regard to obtaining help, and continues its operations uninterruptedly.

The Ajax Rubber Co. plans to erect a new factory at Toledo. The Trenton, New Jersey, and Racine, Wisconsin, plants are running to capacity with three shifts of tire and tube makers. The Trenton factory has been operating night and day for the past two years.

New Jersey Notes

Doland Q. Palmer, Newark, has been appointed receiver for the Consumers' Tire & Rubber Corporation, 494 Broad street, Newark. Incorporated in New York about ten years ago, he says, the concern acquired a plant in Nutley, but never used it. Assets were alleged to consist of the plant, valued at $50,000, and liabilities of about $62,000.

The plant of the Hardman Rubber Co., Commercial avenue, New Brunswick, which went into the hands of a receiver some time ago, has been sold to a textile concern.

The Pneumatic Appliances Corporation, 390 George street, New Brunswick, has been incorporated and will manufacture rubber goods, clothing, springs, tubing, brushes, tires, and deal in air and pneumatic devices and appliances. It will specialize in shock absorbers and pneumatic spring shackles. Alfred Wieland is at the head of the new company.

The Rubber Trade in Rhode Island

All the rubber manufacturing plants throughout Rhode Island are now moving along prosperity's road with a steady swing that augurs well for capacity activity in all lines and departments of the several plants for many months to come. The greatest handicap at present is the scarcity of experienced help, as well as of promising material to be developed into experienced operatives. It is a long time since there has been such a general call from manufacturing rubber concerns for men, women, and young girls to enter their factories, where, almost without exception, wage and time schedules are satisfactory.

Business conditions at the Revere Rubber Co. are the most promising they have been in many months and every department is in need of additional help. Many of them are operating on a full time schedule days with considerable overtime nights. During the past month large numbers have been added to both the day and night shifts but the employment department is still calling for more help, even waiving the question of experience. The company has commenced extensive alterations and additions to its plant and equipment that are expected to improve conditions and facilitate production. While business is good in all lines and departments those producing novelty and seasonable goods are the hardest driven.

Reports of rush work with abundance of orders on hand come from the management of the Davol Rubber Co. and notwithstanding the addition of large numbers of employes to the plant force the company is calling for others. There is no preferment as to department; all are driven to capacity and double shifts are general. The five-story block owned by the company, occupancy

of which by the company's departments began about a year and a half ago, is now practically filled and there is talk of further extending the plant. "Everything is driving," explain the officials when asked which departments are the busiest, and daily shipments have increased several fold during the past few months, with the end not in sight by many months.

At the annual financial town meeting recently held at Bristol, an appropriation was made of $1,250 for the purchase of fire hose.

The joint standing committee of the City Council on fire department of Woonsocket has awarded a contract to the Fabric Hose Co. of New York, to furnish 1,000 feet of fire hose at $1.20 per foot.

A creditors' petition in bankruptcy has been filed in the United States Court for the District of Rhode Island against Myer H. Miller, doing business as the Miller Tire Shop, Providence. The petitioners and their claims are as follows: Pennsylvania Rubber Co., $504.73; Mason Tire and Rubber Co., $352.88, and Kelly-Springfield Tire Co., $24.70.

The Sterling Insulated Wire Co., Providence, has been incorporated in accordance with the laws of Rhode Island, with a capital stock consisting of 500 shares of common, without par value. The incorporators are William Shardlow, of Pawtucket, and Francis J. Brady and Harold W. Thatcher of Providence.

The Rubber Trade in Massachusetts

Manufactured Goods

Rubber shoe factories are turning out the biggest tickets of canvas footwear and light rubbers possible with the available labor, and are recruiting their forces by advertising. A big white season is anticipated, and the labor shortage and late booking of canvas orders from country districts may create a shortage. A considerable gaiter production is also in progress to reduce stock shortages. Orders for summer and fall delivery are larger than at the same time last year. All heel and sole factories are busy, the former with increasing demand as standard equipment for new goods, the latter in response to the approach of the sports season.

Mechanical goods factories have been making new peak records, owing to the general speeding up of industry, large railway equipment orders, and the seasonal demand in numerous lines. The resumption of building following the winter has stimulated the demand for insulated wire and most makers are behind on their orders. A good seasonal business is reported in waterproof clothing, specialties and novelties.

Record automobile production is reflected in tire and automobile topping factories operating at capacity. Tire sales have been stimulated by spring replacement needs and the prospect of further price advances.

Everlastik, Inc.

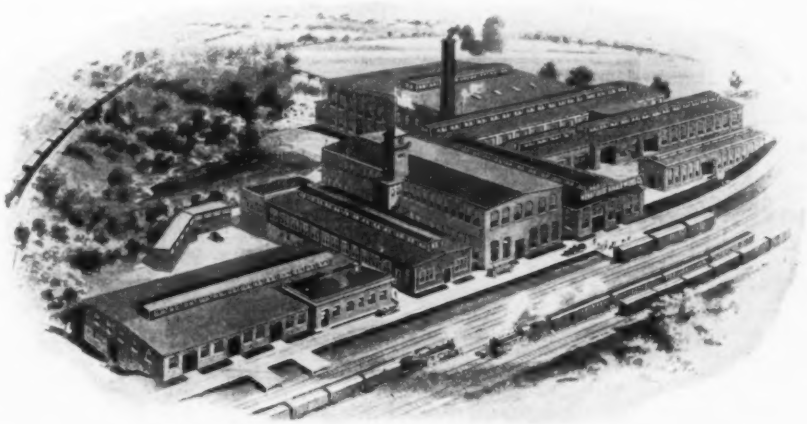
Everlastik, Inc., of Chelsea, Massachusetts, is the largest manufacturer of elastic fabrics in the world. The seven long established and successful fabric mills which make up the organization are as follows: T. Martin & Bro. Manufacturing Co., Chelsea and Lowell, Massachusetts; Hub Gore Makers, Brockton, Massachusetts; Leolastic, Inc., Bayonne, New Jersey; Bridgeport Elastic Fabric Co., Bridgeport, Connecticut; Mansfield Elastic Web Co., Mansfield, Ohio; Smith Webbing Co., Pawtucket, Rhode Island.

Executives of Everlastik, Inc., comprise the following: president, B. T. Martin, Chelsea, Massachusetts; vice president and counsel, John Abbott, Boston, Massachusetts; treasurer, John E. Page, Chelsea, Massachusetts; secretary and assistant treasurer, W. L. Martin, Chelsea, Massachusetts; assistant secretary, Wilwyn Herbert, New York, N. Y.; Charles B. Stretch, general manager, Chelsea, Massachusetts. The above officers and the following constitute its board of directors: B. J. Baker, Boston; W. B. Spencer, Bridgeport, Connecticut, and F. R. Parsons, Providence, Rhode Island.

Stedman Reclaiming Facilities Being Increased

The Stedman Products Co.—Monatiquot plant—is working to capacity. Having immediately felt the improvement in the crude rubber market, production of reclaims was increased and new equipment installed to meet the demand for Monatiquot brands. Practically an entirely new reclaiming unit is being developed to coincide with the present equipment.

The organization has been strengthened by the addition of George W. Bailey, as treasurer. Mr. Bailey is well known, particularly in the shoe industry, where for several years he was president of the Bailey-McElwain Shoe Co., Hudson, Massachusetts. The entire plant now operates as a division of the Stedman Products Co., manufacturers of Stedman naturized flooring.



Plant of the Monatiquot Rubber Co.

Gaiter Popularity Likely to Continue

The past month has been a between-seasons period in the rubber footwear trade, during which much attention has been devoted to future probabilities. Rubber footwear producers must follow leather shoe manufacturers, and with so many new lasts having different heel heights the problem of rubber footwear to fit is a complicated one. The height and style of heels is of great

moment to rubber footwear makers, and in this connection E. P. Pearson, sales manager of the Converse Rubber Shoe Co., Malden, expresses the opinion that women will favor the medium military heel next season, continuing their preference for low shoes and wearing gaiters for winter protection.

Statistics of Rubber Manufacture

Rubber goods amounting to $151,493,566 represented almost one-twenty-ninth of the value of the manufactures in Massachusetts for the year 1920, according to the 35th annual report of the Director of Statistics, which has just been published. Substantial gains over the previous year are shown, and the state still maintained its leading position in the manufacture of rubber boots and shoes.

Eight establishments with an invested capital of $42,396,532 using stock and materials valued at $25,440,570, and paying wages amounting to $18,940,608 to an average of 14,883 wage earners, produced rubber boots and shoes to the value of $65,715,095. Forty-nine establishments with an invested capital of $73,274,212, using stock and materials valued at $42,001,564, and paying wages amounting to $11,779,505 to an average of 8,130 wage earners, produced other miscellaneous rubber goods to the value of $85,778,471. The total value of rubber goods exports is not stated, but 19 establishments selling rubber products exclusive of rubber boots and shoes exported goods valued at $2,770,130.

Although most of the rubber footwear is produced in or near Boston, many of the miscellaneous rubber products are manufactured elsewhere in the state. In metropolitan Boston five establishments, with an invested capital of $35,917,539, using stock and materials valued at $21,006,314, and paying wages amounting to $16,550,713 to an average of 12,988 wage earners, produced rubber boots and shoes to the value of $56,462,475. Miscellaneous rubber goods to the value of $21,131,097 were produced by twenty-one establishments with an invested capital of $14,127,993, using stock and materials costing $8,484,908, and paying wages amounting to $3,123,513 to an average of 2,149 wage earners. The total rubber goods production of metropolitan Boston was therefore $77,593,572, or about 51 per cent of the total for the state.

Boston

The first National Fishing Equipment Exposition was opened on March 26 at the Army Base pier. Practically every branch of commercial fisheries was represented and a large attendance profited by the displays. Rubber boots were shown and their manufacture demonstrated by the Converse Rubber Shoe Co., Hood Rubber Products Co., Inc., and the Beacon Falls Rubber Shoe Co.

The Grow Tire Co., formerly of 323 Columbus avenue, is now occupying new sales rooms at 560 Commonwealth avenue, recently vacated by the United States Tire Co., now located in a new building on Charles River road, Cambridge.

The Boston district of The B. F. Goodrich Co., covering New England, led the twelve other sales districts of the country in the 1922 sales contest, and the winning salesmen have received suitably inscribed gold watch fobs and bonus checks for substantial amounts. Fred T. Moore, New England district manager, is being congratulated not only upon the success of his sales force but upon rounding out twenty years with the Goodrich organization.

The Killion Rubber Co., Dorchester, has been operating at capacity for some months past, turning out 15,000 to 20,000 heels daily.

The City of Boston is continuing its investigation of rubber pavements abroad, Chairman John H. L. Noyes, of the street commission, having been directed by Mayor Curley to obtain information from the authorities of London, England, and Paris, France. If this noiseless pavement is finally considered feasible it will probably be experimented with for the first time in Boston on the four streets bounding the City Hospital grounds in the South End.

The greater fire-resisting quality of rubber as compared with wood has again brought up the subject of paving Harvard Bridge with rubber. On April 20 a fire causing a damage of $5,000 to the bridge occurred which is believed to have originated from a cigarette that fell in between the boards on the wooden surface saturated with oil and gasoline from countless automobiles. Had the bridge been paved with rubber it is doubtful if the fire would have started.

The Grow Tire Co. has leased its former fine location in Governor Square at the junction of Commonwealth avenue and Beacon street, in the heart of the automobile district.

Massachusetts

A recent report of the Massachusetts department of public utilities recommends that all employes engaged in gas manufacturing wear shoes with rubber soles and heels. Department officials believe that the explosion in Springfield in February which caused three deaths and a property damage estimated at $1,000,000, may have been caused by a spark struck by a nail in the heel of a workman's shoe grating on the sand, in the purifying house which blew up.

Net sales of the Fisk Rubber Co., Chicopee Falls, for the first quarter ended March 31, 1923, totaled $14,450,000 and net profits, after depreciation, interest and other surplus charges, were $1,055,000, compared with net sales of $10,154,253 and net profits of $354,969 for the same period of 1922. Although the company is producing automobile tires in its Fisk and Federal divisions at the rate of 23,000 daily, its 128 branches report a shortage of tires to meet their sales requirements.

George L. Finch, engineering superintendent of the Hood Rubber Co., Watertown, is a member of the committee headed by Charles T. Main, the well-known industrial engineer of Boston, which is to make a survey of the New England hydro-electric situation under the auspices of the Associated Industries of Massachusetts.

Appreciating the value of window displays in retail stores to increase canvas footwear sales, The Hood Rubber Products Co., Inc., of Watertown, has announced a window display contest closing July 15 with prizes of $150, $75 and several $10 prizes for the best photographs of displays during the weeks previous to May 30 and June 17.

The Arthur Jackson Wills Estate, North Brookfield, Massachusetts, makers of special rubber machinery, is now managed by Harry E. Wills, a nephew of the deceased Arthur Jackson Wills. The new manager has largely increased the business and made many desirable improvements in the Wills trimmer.

The Rubber Trade in Ohio

Manufactured Goods

The present month probably marks the peak of automobile tire production. While some of the companies, notably the Goodyear and the General, are planning to increase tire production slightly during the next few weeks, there are reports of curtailments in other factories which indicate that the high point has been reached. Production thus far this year has been on the basis of between 50,000,000 and 60,000,000 tires a year, which is slightly in excess of the demand, and therefore it seems reasonable to expect a slight tapering off in production to avoid any sharp reductions at the middle of the year.

In other lines, the production tickets indicate an upward curve and this will probably be continued for at least two months. This tendency is outstanding in mechanical goods where increased mining operations, railroad purchases and some buying on the part of the farmers is creating an active demand. The first three months of the present year were much better in mechanicals than

the same months last year, and it is not improbable that a 15 or 20 per cent increase will be witnessed in this line during the present quarter. Footwear sales continue to be very good for next fall, with novelties especially strong, while heel production continues at an unprecedented rate.

Firestone Activities

Firestone Tire & Rubber Co. is adding to its production, and is now making more than 31,000 tires a day, the largest output in the history of the company. This figure is exclusive of the Hamilton, Ontario, plant where output is in excess of 1,000 tires a day.

The company has stressed the new small-diameter, large cross-sectional tires which were perfected last year, and it is believed that a substantial business will be done in them during the remainder of the year, or at least during 1924.

The tires, as explained several months ago in THE INDIA RUBBER WORLD, are four inches smaller in inside diameter than the standard tire and will, therefore, bring the body of the vehicle to which they are applied two inches closer to the ground.

The company has received a large order from a taxicab company for these tires, the first substantial order which has been reported in Akron. Other companies, including the Goodyear Tire & Rubber Co. and The B. F. Goodrich Co., have perfected smaller tires and are also active in obtaining fields for their use. The new tires will be made as large as 36 by 8, and the sizes already available include 34 by 7, 32 by 6, 30 by 5, and 29 by 4½.

J. J. Shea, treasurer of the Firestone Tire & Rubber Co., has been elected a director to fill the vacancy caused by the resignation of Thomas Clements, formerly vice president and comptroller of the company. Mr. Clements leaves Akron to operate the Firestone Cotton & Oil Co., at Phoenix, Arizona, at one time a subsidiary of the Firestone Tire & Rubber Co.

Stadelman Becomes President of Goodyear

George M. Stadelman, for many years vice president and sales director of the Goodyear Tire & Rubber Co., has been named president of the company to succeed E. G. Wilmer who became president when the company was reorganized two years ago. Mr. Wilmer becomes chairman of the board of directors and of the executive committee, and will locate permanently in New York, N. Y., where he will continue to carry full responsibility for the supervision and direction of the Goodyear management. Mr. Stadelman came to the company when it was founded 22 years ago. He is looked upon as one of the outstanding sales directors in the rubber industry and much of the growth of the Goodyear Tire & Rubber Co. originally was due to Mr. Stadelman's sales efforts.

In the reorganization, P. W. Litchfield assumed the title of first vice president, and F. K. Esphain will continue in Akron as vice president and personal assistant to Mr. Wilmer. Three new stockholders' representatives and a representative of Dillon, Read & Co. have been added to the board of directors. They are: Henry B. Manton, Robinson Clay Products Co.; George Crouse, Crouse Clay Products Co.; Fred. Harpham, William N. Fisk, Chicago manager for Dillon, Read & Co. In addition to these men the directorate now consists of E. G. Wilmer, P. W. Litchfield, Grayson M. P. Murphy, John R. Nutt, R. P. Schaffer, A. A. Schlessinger, Francis Seiberling, H. H. Springford, D. M. Stadelman, Russel R. Robinson, and Ralph Van Vechten.

Goodrich Officers and Directors Reelected

At the annual meeting held April 18 The B. F. Goodrich Co., Akron, Ohio, reelected all directors whose terms expired. In accordance with charter provisions the stockholders voted to retire 11,880 shares of preferred stock. At the regular directors' meeting following all officers were reelected, no changes being made. President Work reported the volume of business for the first quarter of the present year as being very satisfactory, and showing a marked increase over the same period for the previous year.

L. A. McQueen W. A. Johnson H. M. Bacon A. G. Partridge

The following changes in sales personnel have been announced:

L. A. McQueen has been appointed advertising manager, succeeding E. D. Gibbs who resigned several weeks ago. He will supervise the sales promotion work with dealers, and will correlate the advertising of the company with it. W. A. Johnson has been named manager of the tire merchandising division, which has just been created. A. G. Partridge, formerly vice president and sales manager of the Firestone Tire & Rubber Co., succeeds him. T. A. Aspell continues in charge of truck tire sales. H. M. Bacon has been named manager of branch operations, and will be assisted by P. H. Sears as manager of the branch administration department.

Akron

Henry L. Hank has resigned as secretary and treasurer of the American Tire & Rubber Co. and his duties will be taken over by Floyd C. Snyder, son of Fred H. Snyder, president of the concern.

Poncet Davis Co. announces the removal of its offices, effective April 1, 1923, from the Central Savings and Trust Building to 225 Ohio Building, Akron. The organization, as a manufacturers' representative, handles yarns, drills, tapes, hollands, osnaburgs, sheetings, and tire fabrics for the rubber trade.

At the recent annual meeting of the stockholders of The Mohawk Rubber Co., Akron, O., all the directors were reelected,

while at the annual directors' meeting the following executives were chosen: R. M. Pillmore, president; S. S. Miller and M. E. Mason, vice presidents; P. H. Goodall, secretary; W. J. Cope, treasurer; and R. E. Bloch, assistant treasurer.

The Akron Rubber Service Co., Akron, is equipped to render technical service to rubber manufacturers who do not have laboratories to carry on their experimental work. A specialty is also made of the manufacture of Excel marking crayons and Excel accelerators especially adapted for the rubber trade. Executives include the following: Lysle R. Grant, president; William B. Howell, general manager; and C. E. Boord, consulting engineer and chemist.

The Good Rubber Co., East Akron, has been incorporated for $10,000 to make toy balloons. W. D. Good is the organizer of the company and E. K. Good, R. H. Berkey, J. B. Good, and C. A. Farlin are his associates.

Ohio

The sale of the Republic Rubber Corporation, Youngstown, Ohio, has been postponed by the receiver, C. B. Booth, for at least a month. The receiver's plan to raise money through new financing by old stockholders to take over the company through a receiver's sale did not materialize as expected, and other means will be planned to lift the receivership.

The Newton Falls Rubber Co., of Cleveland, has purchased the plant of the Trumbull Tire & Rubber Co., of Newton Falls. The new company is capitalized at $500,000, with Ervin Jordan, formerly of the Liberty Tire Co., as vice president and general manager. The plant at the present time has a production of more than 2,000 tires a day.

The Excel Tire & Rubber Co., Wadsworth, is being operated under Frank L. Lytle, receiver, appointed by the common pleas court. This is the outgrowth of misunderstandings between stockholders and is the second time the company has been in a receivership in two years. The manufacture of rubber belts continues.

The Eclat Rubber Co., Cuyahoga Falls, will build a small plant at Kent, Ohio, for the manufacture of rubber tubing. Construction has already been started and the machinery has been ordered.

L. E. Wemple has resigned as manager at Columbus, Ohio, of the American Zinc, Lead & Smelting Co.'s subsidiaries to accept the vice presidency of the Evans Lead Co. Mr. Wemple, who is a M. I. T. man and an expert metallurgist, is also an inventor of zinc oxide refinery processes and a designer of such plants. He is the author of several scientific papers on refining slab zinc and the manufacture and uses of zinc oxide ore.

The Mason Tire & Rubber Co., Kent, Ohio, has recently appointed S. W. Wales as one of its representatives, Mr. Wales' territory comprising Vermont and western Massachusetts.

Thornton Emmons, successor to L. E. Wemple, will become manager at Columbus, Ohio, of the oxide department of the American Zinc, Lead & Smelting Co., retaining however his position as assistant manager of sales of the American Zinc Sales Co. A. C. Eide, formerly manager of the Chicago offices, will now be in charge of production both at the Columbus and the Hillsboro plants. He will also direct the paint and rubber research laboratories at Columbus. The Chicago offices will be closed, but warehouse stocks will be maintained in that city. J. I. Wall, formerly purchasing agent, will be in charge of local affairs at Columbus as plant manager.

The Qualitex Co. has recently acquired the plant at Oakview and Nottingham Roads, Cleveland, Ohio, formerly occupied by The Ohio Motor Vehicle Co., and not the factory at Newton Falls owned by the Hubbell Tire & Rubber Co. About May 15 The Qualitex Co. will begin the manufacture of hard rubber products, including battery boxes and retainers, steering wheels for automobiles, etc.

The Rubber Trade in the Midwest

Manufactured Goods

The present cost of tires is not hindering sales in the midwest; in fact, many manufacturers are behind their schedules for shipments to both wholesale and retail tire dealers. The new building activity has accelerated to a great extent the sales of insulated wire, molded goods, plumbers' specialties, etc. There is a strong demand for transmission and conveyor belting and packings, due to the increased activity in automobile plants, mills, and implement manufactures in the Chicago district. Retail sales of rubber footwear have been fair, and druggists' sundries steady with increasing inquiries and orders for rubber bathing goods. The late winter has retarded the sale of garden hose and other seasonal specialties, but with the opening of spring weather orders have been increasing daily.

New President of Midwest Association

Instrumental in organizing The Midwest Rubber Manufacturers' Association, Thomas Follen, its new president, has also served that body as director, vice president, and chairman of the financial committee.

Thomas Follen

Born in Germantown, now Pershing, Indiana, and trained in Indiana schools, Mr. Follen's business activities have centered in that state and neighboring sections of the Middle West. While his early connections were with the railroad and coal industries, he organized, in 1916, The Lion Tire & Rubber Corporation, Inc., of which concern he is still president and manager, having formerly acted as its vice president and assistant treasurer.

Under Mr. Follen's direction the company has prospered and is now planning a considerable increase in production, while the capital, originally $150,000, has been increased to $700,000. His wide acquaintance with business affairs and his executive ability as shown in the holding of positions of responsibility make Mr. Follen eminently fitted to assume the duties of his new post.

The Midwest

The assets, including the patents, of the Elgin Rubber Ace Co., were recently purchased at trustee's sale, and a new organization, capitalized at $200,000, will carry on the business under the name of the Rubber Ace Corporation, Elgin, Illinois. New machinery and equipment supplying about ten times the capacity of the former plant has been installed, the product being confined to Rubber Ace pneumatic inner tubes, made to fit any size or make of automobile casings. F. D. Lake is president.

Officials of The Brunswick-Balke-Collender Co., 623-633 South Wabash Avenue, Chicago, Illinois, announce that Theodore Brown, formerly connected with the General Tire & Rubber Co., and later with the Republic Rubber Co., has recently become associated with their organization. Mr. Brown will serve with the rubber division at the company's general offices in Chicago.

On April 1 the American Insulated Wire & Cable Co., 21st, Sangamon and Morgan Streets, Chicago, Illinois, began the manufacture of magnet wire, its products being sold under the trade name of A-1 Magnet Wire. The company will maintain the same high standards for quality in this wire as represented by its other lines. M. B. Morris is secretary of the organization.

Two recent appointments by the Lee Tire & Rubber Co., 245 West 55th Street, New York, N. Y., include the selection of

J. C. Bay as branch manager at Des Moines, Iowa, and C. K. Daniels as branch manager, at Indianapolis, Indiana.

The Bike Web Manufacturing Co., 29 South Clinton street, Chicago, Illinois, manufacturer of elastic webbing, has awarded a contract for the construction, at 4113-25 Ravenswood avenue, Chicago, of a one-story, reinforced-concrete mill. The new structure, which will measure 80 by 165 feet, will cost approximately $45,000.

Recent changes in the executive personnel of the Marathon Rubber Products Co., Wausau, Wisconsin, manufacturer of rubber specialties, include the following: A. Bennett becomes general manager; Frank R. Stone will serve as district sales manager, his territory covering the states of Illinois, Indiana, Ohio, lower Michigan, Pennsylvania, and New York; G. B. Stacy as district sales manager will cover the middle western territory, having his headquarters at Minneapolis, Minnesota.

The Rubber Trade on the Pacific Coast

Manufactured Goods

The probability of a few more tire-making concerns being promoted and possibly put on a production basis on the Pacific Coast in the near future is much discussed in rubber circles. Most of the concerns in that line are doing well and those that failed met with disaster, it is claimed, only through innate managerial weakness. The recent rise in tire prices has stimulated organization talk, but the more substantial reasons given for a further expansion in the coast tire-making industry are given succinctly as: 90 per cent of the needed materials are readily available on the Pacific seaboard; 30 per cent of the tires made in the United States are used west of the Mississippi; and yet scarcely 3 per cent of the tires used west of the big river are made on the Pacific Coast. Then, too, labor and power are generally cheaper than in the East and Midwest, and trans-continental freight rates put the coast tire maker in a favorable position.

An excellent demand for tires is reported at nearly all the coast points, despite recent advances in prices, buyers evidently being convinced that the new figures are more likely to be revised upward than downward in the next few months. The oil boom, in Southern California especially, has been a boon to many manufacturers of valves, sleeves, packings, suction and discharge hose, beltings, etc., but rivalry is keen now, with the result that there is more price shading on some goods than heretofore. The revival of mining, considerable activity in buildings, and extensive developments on public works are helping to keep up a lively demand for mechanicals in general, and many concerns report a marked improvement in sales of automobile accessories and other rubber specialties. A better market for druggists' sundries is reported by the large distributors.

Los Angeles

The Santa Fe Carbon Co. is erecting works at Cherry and Inez streets, Long Beach, adjoining Los Angeles, to supply carbon black to Pacific Coast rubber manufacturers. The gasoline absorption plant will have an initial capacity of 4,000,000 cubic feet of natural gas drawn from wells in the Signal Hill oil field, in which, it is stated, there is a gas wastage of 135,000,000 cubic feet daily.

The Eno Rubber Co., 1026-1030 S. Los Angeles street, Los Angeles, reports increasing sales, the installation of new machinery, and increased working force. The concern makes rubber goods for the oil fields, mechanicals, patented specialties, and tire repair materials. Tires will also be undertaken soon.

The West American Rubber Co., 400 N. Avenue 19, Los Angeles, is operating two shifts and reports good sales of mechanical goods. The works were recently enlarged and the equipment increased.

Virgil A. Martin, branch manager of The B. F. Goodrich Rubber Co., Los Angeles, states that last month's sales exceeded those in April, 1922. Demand for tires continued strong even after the close of the spring dating season, when a let-up was anticipated.

The Long-Turney Corporation, 1920 E. Vernon avenue, Los Angeles, has an excellent factory equipment for making valves, packings, retread stocks, medical appliances, oil well supplies, radio parts, rolls, heels, mats, plumbers' supplies, etc. Emmet S. Long is president, Geo. W. Turney, vice president and general manager; and D. H. McDonald, secretary-treasurer.

J. B. Magee, United States Rubber Co. branch manager in Los Angeles, reports exceptionally good trade in southern California, where the company has thirty-two road salesmen.

The Samson Tire & Rubber Co., Compton, will supply supersize cords as standard equipment for the 150 new type motor coaches of the California Transit Co., Oakland, said to have the largest stage line in the world. F. H. Hearsch, sales manager, has recently established many new selling agencies on the coast.

The Goodyear Tire & Rubber Co.'s Los Angeles plant is running full time in all departments, and daily output is averaging slightly more than a month ago. The main sales branch in Los Angeles has been moved from S. Olive and 12th streets to 1220-22 S. Grand avenue.

The Rubber Specialty Manufacturing Co., Huntington Park, Los Angeles, has been organized with an authorized capital of $25,000. The directors are: G. B. Sargent, Huntington Park, and W. T. H. Eimers and H. F. Eimers, Los Angeles.

The Walton Airless Tire Co., Los Angeles, has been incorporated with an authorized capital of $1,000,000, to manufacture a hollow or cushion-tire. The directors are: J. S. Walton, G. O. Walton, J. A. Judkins, W. A. Kampmann, G. B. Stephens, G. W. Welsh, and Ernest E. Nichols, attorney, of 457 S. Spring street, Los Angeles.

According to A. E. Boal, branch manager, the Ajax Rubber Co.'s Los Angeles business for last year was 64⅓ per cent over that of the year before. Tire and tube unit sales were 184 per cent higher.

The Huntington Rubber Co., 8th and Los Angeles streets, Los Angeles, one of the pioneer vulcanizing and general rubber repairing concerns in the Southwest, has been merged into the Pacific Rubber Corporation, one of the younger yet one of the largest tire dealing concerns on the coast, with branches in several cities. The latter has just moved into its new buildings at 8th and Wall streets. Roy R. Meade is president and general manager and H. H. Huntington is vice president.

Pacific Coast Notes

President John I. Pankratz, of the Coast Tire & Rubber Co., Oakland, has announced an increase in price of 10 per cent on tires and 7½ per cent on tubes. The company, one of the youngest concerns on the Coast, has already 700 agencies in California, Oregon, and Washington, besides others in other western states and in foreign countries.

A. F. Peterson, branch manager of the Fisk Rubber Co., has taken over the San Francisco business of The Federal Rubber Co.

J. S. Holstein, of the Hartford Rubber Works, Hartford, Connecticut, and Frank V. Springer, vice president of the Hewitt Tire & Rubber Co., Buffalo, N. Y., have been studying trade conditions recently in this section.

The Columbia Tire Co., Kenton, near Portland, Oregon, went into production during the past month, and the opening was celebrated in a gala manner, the Portland Chamber of Commerce and many civic societies taking a lively interest in the affair. The company has a fine new steel and concrete 2-story building 80 by 350 feet and "last word" equipment. R. A. Wurzburg is president and Alfred A. Aya vice president and sales manager.

ERNEST F. KLING, FORMERLY GENERAL MANAGER OF THE BATAVIA Rubber Co., Batavia, New York, is now associated as factory manager with the Canada Star Rubber Co., Limited, Toronto, Canada.

The Rubber Trade in Great Britain

By Our Regular Correspondent

THE long drawn out Merlimau case has now been decided, the final court of appeal, the House of Lords, having unanimously given judgment against the company. Briefly, the point at issue was whether in the case of the rubber estate bought by the company in an immature condition in 1907 the increase in value could be treated as a new asset to the original estates for taxation under certain clauses of the Excess Profits Duty act. Now that this act is a thing of the past it is only awakening unpleasant memories to refer to it, but it will be some little time before many firms have finally done with it.

Rubber Slab Pavement

Some interesting developments in the laying of rubber roadways have recently been made by Chas. Macintosh & Co., Limited, in one of the streets contiguous to their works in Manchester. Instead of the usual method of having small blocks of rubber singly, as in the case of wood pavements, the firm is using large slabs of rubber weighing about 600 pounds each and 2 inches thick so that the tendency to creep or lift may be reduced to a minimum. The surface of the slab is corrugated, thus supplying a safe foothold for horses. Being reinforced at intervals with steel bars, the slabs are kept rigid while retaining the necessary pliability to insure noiselessness. With regard to previous experience it may be recalled that the firm laid rubber pavement in St. Pancras Station, London, in 1876, and at Euston Station in 1881, portions of these being still in existence. Presumably price has been the determining factor which has retarded the extended use of rubber pavement in the somewhat long interval from the dates just mentioned. Even today, with cheap rubber and all the booming which it has had, the business is only of small dimensions. Linoleum is still the cheaper commodity and architects and others responsible for placing orders are inclined to harden their hearts in the presence of the would-be seller of rubber flooring.

Institution of Rubber Industry

At the March meeting of the London Section a paper on "Rubber and Gutta Percha Telegraph Cable Manufacture" was read by H. Savage, works manager of W. T. Henley's Telegraph Works Co., Limited. The trend of the paper was to put the main facts of the manufacture before those who were presumably ignorant of them rather than to teach the experts in the submarine telegraph industry anything new about their special trade. Judging by the discussion, it does not seem to be generally known that though one or two firms make rubber insulated cables for certain submarine work, yet the gutta percha covered cable is still pre-eminent, the general position being practically the same as it was in 1861, when a committee which had considered the relative advantages of rubber and gutta percha decided in favor of the latter, an important consideration being that while rubber was porous under pressure gutta percha was not.

Notwithstanding the improvement in rubber manufacture in the last 60 years, the fact remained, Mr. Savage said, that gutta percha was still used almost exclusively. Balata had not been used as a substitute for gutta percha in submarine work, though he understood it had been used to a limited extent for covering telephonic conductors. With regard to the further use of rubber in submarine work it was up to the rubber industry to see if this could be done. Mr. Savage made special mention of the scarcity and price of gutta percha in the period between 1860 and 1875, and to the efforts which were then made to replace it by vulcanized rubber. Compounding, it was found, increased the electrostatic capacity and this tended to retard the signals and cause inefficient transmission. Pure rubber allowed the conductor to get out of section and was somewhat porous so a trial was made of a pure rubber coat covered by one containing zinc oxide and then an outer coat containing a large proportion of sulphur so as to vulcanize rapidly. The result, however, was not equal to gutta percha as regarded imperviousness to water. A method of vulcanizing in ozokerite was brought out by Mr. Henley in 1875, but with only partial success.

Mr. Savage said it was interesting to note that the use of a pure rubber layer had survived in England to the present day for rubber insulated cables for purposes other than telegraphy or telephony, though such practice did not obtain either in America or elsewhere in Europe. The terms "separator" and "jacket" also survived after a lapse of 60 years, although for the majority of present day users they had lost their original meaning. Reference was made to the former wasteful method of obtaining the gutta percha by felling the trees, the yield by tapping not being so great. The author did not say whether felling the trees had now been abandoned, but referred to processes for obtaining gutta percha from leaves and twigs. This is now done by mechanical methods, chemical methods yielding a product unsatisfactory for electrical purposes.

The gutta percha is applied to the wire in cablemaking by a forcing machine, several wires being covered at one operation. The material is first made plastic by mastication and is then extended through dies by means of rollers and a screw. When covered the wire is passed through long troughs of cold water, thus making it sufficiently hard to enable the core to be wound up on drums. Three consecutive layers of covering are commonly used, the wire and the first and second coverings being given a film of Chatterton's compound to insure adhesion of the subsequent covering.

In concluding his paper the author gave some statistics of the submarine cables laid, stating that the number now was 2,968, with an average length of 704 nautical miles and a total length of 309,164 nautical miles. Of these, 506 cables totaling 239,689 nautical miles are owned by companies, the remaining mileage being made up by 2,462 shorter cables belonging to government administrations. The largest system, the Pacific cable, is being duplicated, 28,000 miles having been laid since the armistice, according to a statement of the chairman of the Eastern and Associated companies.

The custom of having as chairman some one associated with the subject of the paper was followed. Percy Rosling undertook the duty and gave some of his experiences in cable laying.

Some Mechanical Problems in the Rubber Industry

Under this title H. C. Young, Assoc. M. I. M. E., read a long and informative paper before the Institution of Mechanical Engineers in London last February. The paper was replete with observations on the machinery used in rubber manufacture and with suggestions as to how best the rubber works engineer could carry out the various demands which are made upon him. It is not explicitly stated what the author's position is and I am not in a position to vouch for the accuracy of the surmise that he is engaged with a very important rubber works in the vicinity of Birmingham. His many references to American practice indicate more than a book knowledge of that country's methods and it would seem that as regards first-hand knowledge he is more acquainted with America than with the Continent. The paper has been reproduced in the rubber press, also in *The Engineer*, where a leader devoted to it bemoaned the difficulties that en-

gineering firms labor under in not being able to get more ready access into our rubber factories.

It would be impossible in the space at command to review the paper and I shall do little more than make this reference to it. Some stupendous figures relative to the American industry are given, 500 tons of crude rubber being used weekly. Comparisons of cost of building rubber factories are given, showing that in England the average cost of multi-story buildings is about 30 per cent more than the single story. In America, the author states, this state of affairs is reversed, the multi-story building on an average costing about 25 per cent less than the single story. The author quotes the figures given in THE INDIA RUBBER WORLD of July, 1922, showing the total amount of primary horse-power available in United States rubber factories to be something like 430,000 and the total number of wage earners employed in the industry to be 206,000, which estimates, he says, give a load factor of about 0.23 on plant and the output of rubber per worker 70 to 75 pounds per week. These figures differ somewhat in actual practice, but they could be utilized, he thought, to advantage when the layout and equipment of a works were under contemplation.

The Proofing Branch

One hears a good deal about the patchy condition of trade and it has to be borne in mind that the demand is not equal for all classes of goods, and as all firms do not do identical work one may be busy while another is on the slack side. Although the bulk of our proofers are also makers of garments there are two prominent works, Cairns & Co., of Glasgow, and A. O. Ferguson & Co., Limited, of Windsor Mill, Hollinwood, Manchester, which do only proofing for the trade and who therefore do not enter into competition in any way with their customers. The latter firm has 35 spreading machines, many of them the large 19-foot size. On the occasion of a recent visit I found that there was no grumbling about trade conditions, there being work for 34 of the machines. The rolls of cloth proofed to customer's requirement go all over the world, business being by no means confined to the home trade. Referring to current trade generally in the proofing branch, while the home trade is slow except in motor hood material, the demand from abroad has shown considerable expansion.

British Notes

On April 3 the offices of George Hankin & Co., brokers in balata, gutta percha, and rubber latex, were removed from 27 to 21 Mincing Lane, London, E. C. 3, England.

A receiver and manager has been appointed for the New Atlas Rubber Co., Limited, located at Miles Platting, Manchester, in behalf of the debenture holders.

INTERNATIONAL RUBBER AND ALLIED TRADES EXHIBITION

Under the patronage of His Majesty the king of the Belgians, the Sixth International Exhibition of Rubber, other Tropical Products, and Allied Industries will be held April 1 to 16, 1924, in the Hall of the Cinquantenaire, Brussels, Belgium. Space is being provided for participating governments, associations, and industrial concerns, the following having already expressed their intention to exhibit: The Rubber Growers' Association; a group organized by the Ministry of Colonies, Brussels, and including exhibits by leading Congo companies and Belgian manufacturers; French manufacturers, including some from the French colonies and protectorates. Active support will also be given by the Netherlands Indies, Ceylon, Malaya, and the Philippines. Brazil also is preparing to take an important part.

Manufacturing appliances, rubber and rubberized goods, reclaimed rubber, chemicals, colors, fillers, etc., will be exhibited, and for the first time in the history of these expositions retail as well as wholesale business will be transacted. Inquiries should be addressed to H. Greville Montgomery, 43 Essex Street, Strand, W. C. 2, London, England.

German Rubber Trade

The attempt of the government to stabilize the mark at 20,000 to the dollar was not regarded with approval by everyone, for in these abnormal times low marks mean high prices and good business while high marks bring with them decreased prices and slow business.

Consequently the sudden collapse of the mark to 33,000 to the dollar, is probably regarded by the industrial and business world with more equanimity than might be expected, whatever the feelings of those politicians may be for whom stabilization is an important factor in the Ruhr situation.

Business men do not accord the government's decision to stabilize the mark at 30,000 to the dollar their unqualified approval. They objected to the previous attempt to bolster up the mark and the immediate results of marks at 20,000 to the dollar seem to show that from their purely business point of view they were right.

For instance, not in years have the results of the Leipzig Fair been so disappointing as was the case this spring. For some time past it had been noted that German prices had reached and in a few instances had even overtopped the prevailing world market prices. The brief reign of the high mark caused German prices in many cases to become *much* higher than the rates for the same class of goods in foreign countries. As an example, the German price for rubber tubing of medium dimensions for Holland was 2.50 gilders (one gilder equals $0.40), while in Holland similar tubing could be had for 1.50 gilders. Again, Germany delivered red rubber tobacco pouches to England at the rate of 7*d*. each, while the English market price for a similar article was 3*d*. to 4*d*. each.

As a result, comparatively little business was done with foreign firms. Home consumers bought in driblets except in the case of heels and soles and other articles for which there is always a good demand. In short, except in these lines, rubberized clothing and certain lines of rubber toy novelties, business was ominously dull.

Death of Herr Thoenes

Gustav Thoenes, the co-founder and senior partner of Sächsische Asbestfabrik G. & A. Thoenes, Dresden-Radebeul, died on March 19, at the age of 72 years. As one of the founders of the above firm, which specializes in technical goods including rubber and asbestos articles, the deceased was well known in German rubber circles and his noble character caused him to be held in high esteem.

Hamburg Rubber Market

During the past year the importance of Hamburg as a rubber market increased notably owing to the active demand for crude rubber by German consumers. The German consumption of crude rubber for the first nine months of 1922 amounted to 21,137 tons against 21,583 tons for the corresponding period of 1921. It is estimated that for the whole year the imports were about 25,000 tons. The prices of crude rubber varied from 50 to 5,000 marks a kilo, according to the rate of exchange. At the beginning of this year the price was 17,500 marks a kilo!

New Rubber Goods

New uses are being found for rubber, not only belts for men but girdles for women. These are quite elaborate and made in combination with galalith, celluloid, and metal in plaques, rings, and braids. A pleasing variety of colors is shown. Sponge rubber is used in many ways. It comes in combination with towel-cloth; as a lining for gloves; with an asbestos covering it forms kettle holders; mats for hospitals and bath tubs; and sandals with sponge rubber layers are in request for bathing and sporting purposes.

The Rubber Trade in the Far East

By Our Regular Correspondent

Malaya

THE American attitude regarding rubber restriction is being strongly criticized here. People object to the outcry that Americans have been making against the effort of local producers to save themselves from ruin. It is repeatedly pointed out that American cotton, wheat, or similar interests do not hesitate to take measures to keep up the prices for their commodities when the occasion arises, therefore why should America complain when Malayan planters take similar action. Again, were it not for British enterprise and the millions of British capital, America would be paying a good deal more for her crude rubber than she did even in the boom days of 1910.

Those who regard American plans in the Philippines and South America as serious take no exception to such a course. It is felt that since America is a great consumer of rubber it would not be safe for her to depend always on a product that is produced thousands of miles away in lands not under her direct control. At the same time it must be added that no great fear is felt here that American grown rubber will be able to compete seriously with the Malayan article, at least not for many years to come. In the meantime it is expected that manufacturers will have learned to realize that the present price for rubber is not exorbitant.

Restriction Statistics

The standard production of the Federated Malay States has been assessed as follows:

	Holdings of 25 acres and under. Tons	Holdings between 25 and 200 acres. Tons	Holdings over 200 acres. Tons	Total Standard Production. Tons
Perak	21,465.1	4,860.9	31,250	57,576
Selangor	12,176.0	3,469.4	36,607.1	52,252.5
Negri Sembilan	5,081.7	3,866.4	24,553.5	33,501.6
Pahang	3,279.7	1,244.5	2,678.5	7,202.7
Totals, tons	42,002.5	13,441.2	95,089.1	150,532.8

A telegram from the Colonial Secretary authorizes the standard production of small holdings of under 25 acres where actual yields are unknown, to be placed at 426 pounds per acre for the first five acres and 320 pounds for the remainder. The result will be an addition of about 10,000 tons extra for the Federated Malay States, making the total Standard Production about 160,000 tons, or around 8,000 tons per month for export while the percentage continues at 60.

The amount exportable during the first quarter was 26,366.2 tons including 3,786.3 tons of stocks licensed for export. However, only 21,217.9 tons were actually exported, the balance amounting to 5,148.3 tons. During November, 1922, the quantities of crude rubber passing through the customs totaled 4,708 tons; during December, 6,990.1 tons and during January 9,519.8 tons.

The standard production for the Unfederated Malay States follows; the figures are not quite complete and most of the data for the state of Kedah are not yet available. However, the total standard production is estimated at 78,000.

	Holdings of 100 acres and under. Pounds	Holdings over 100 acres. Pounds	Stocks licensed in tons. Pounds	Exports first quarter in tons. Pounds
Johore	46,433,000	61,311,000	1,138.5	4,297.8
Kedah	.....	26,242,273	.....	2,733.7
Kelantan	1,015,702	7,090,706	234	611.8
Trengganu	498,754	1,187,934	13.9	96.1

The exports of Kedah, 2,733.7 tons, are for November and December, the January figures not being available.

For the Straits Settlements, excluding Singapore and Penang, the standard production is estimated around 29,000 tons, this together with 160,000 tons and 78,000 tons for the rest of Malaya brings the total standard production for 1923 at approximately 270,000 tons, which, be it noted, is 50,000 tons more than has generally been considered to be the annual output of Malaya. On a 40 per cent restriction basis, Malaya's exports for the current year will amount to something like 162,000 tons, which is 12,000 tons more than was exported during 1921. The above figures give much food for thought and serve to impress upon all concerned that it was high time restriction came in. As all estimates hitherto have been based on a 220,000 tons-production, it will be necessary to revise all calculations and take the higher figure into consideration.

Coupons and Licenses

Owing to the practice of licensees of exchanging their licenses for coupons, such a mass of coupons has to pass through the customs that the working of the restriction scheme is being hampered, for due to the numbers of coupons the chances of forged coupons escaping detection are increased. Consequently, licensees have been requested to refrain from the practice except where it is necessary, as in the case of an estate selling to a local dealer. If this request is not met, it will become necessary to introduce a different system which will not be so simple for the public as far as its operation is concerned.

Bud-Grafting in Experimental Stage

A mild sensation has been created by a paper on bud-grafting written by a local scientist. The writer believes that people are expecting too much from the new method of propagation and that a disappointment is in store for them. The yield of a parent tree, he says, cannot definitely be laid to heredity or environment. And if budwood is taken from a tree whose high yield is due to favorable environment, then the result will be a failure. Experiments with certain fruits, sugar cane and cocoa show that vegetative propagation does not lead to any improvement of race and that better results are obtained with seed selections. Finally, the writer warns planters that the practice of budding is still in the experimental stage and that it should therefore be adopted with due caution and reserved anticipations of its results.

Such advice from a scientist at this time, when definite results have already been secured in Java and Sumatra, while Malaya is backward in bud-grafting as it is, has aroused a good deal of comment. It has been pointed out that while it is undoubtedly true that by planting a given area with buds from one mother tree which may be a good yielder through the accident of favorable environment only, the risk is run of the whole performance being a failure. However, it is obviously not sensible to use the buds from a single high yielder; several good trees should be used and the buds mixed so that the risks may be evened. At the same time, of course, the inferior budded trees would have to be properly marked so that the unsatisfactory mother tree may not be again included in the ranks of the true high-yielders.

It is the opinion that the paper in question is doing planters a disservice by attempting to discourage them from undertaking bud-grafting. As it is, the Agricultural Department has ceased to take interest in bud-grafting, much to the disgust of many planters who regard with apprehension the headway Dutch planters have made in this respect and the possible favorable results.

Ceylon

The year 1922 will long be remembered in the history of the rubber industry as the year in which rubber touched the unprecedented figure of 40 rupee cents a pound.

The year opened with the best grades at 64 cents, after which, except for a small rise in April, prices steadily declined until in August the depths were reached. However, after this matters began to improve and with the announcement in November of the restriction scheme, prices advanced sharply until early December, when 85 cents was obtained. A slight reaction set in, due to disinclination of buyers to operate heavily at the end of the year and to an increase in London stocks owing to heavy harvesting and shipment prior to the restriction period. About Christmas time conditions improved and once more prices showed an upward tendency.

Total exports for the year amounted to 106,102,392 pounds against 90,071,102 pounds during 1921, an increase of 16,031,290 pounds. The principal importers were as follows:

	1922 Pounds	1921 Pounds
United Kingdom	21,975,226	29,707,720
Europe	5,856,137	5,824,134
America	76,720,757	53,880,541
Australia	1,328,638	323,030
Japan	212,689	326,129
Other countries	8,945	9,548
Total, pounds	106,102,392	90,071,102

The exports during the year 1922 were record-breaking, for the highest amount hitherto shipped from Ceylon was 100,400,000 pounds in 1919. Of course it must be taken into consideration that 1919 was the boom year after the war; 1920 saw the slump and in 1921 voluntary restriction of 25 per cent was in force for six months. Consequently the 1922 figures are not unnaturally high but probably represent Ceylon's present standard of production.

As the statistics show, America is Ceylon's best customer for rubber, having taken over 71 per cent of the total exports. At the same time it may be noted that the shipments to America during 1922 were 22,840,036 pounds over those for 1921, an increase of about 42 per cent. On the other hand, exports to the United Kingdom show a decline of 7,750,000 pounds, or something like 26 per cent. Australia took over a million pounds more than during the previous year; Japanese purchases decreased, and the figures for Europe are about the same. The continent of Europe takes chiefly low grade rubbers; exchange difficulties prevent more active business here.

Ample freight space was available during the year, rates being 60*s.* to England for the first six months; later on the rates dropped to 47*s.* 6*d.* A favorable rupee and dollar exchange was of benefit to producers. During the last four years the rubber offered at local auctions was as follows: 1919—37,927,220 pounds, average price 1 rupee; 1920—36,078,693 pounds, average price 70 rupee cents; 1921—37,383,634 pounds, average price 43 cents; 1922—40,202,708 pounds, average price 53 cents.

It has been demonstrated that prices obtained at local auctions compare favorably with those secured in London. Apparently, London producers are beginning to appreciate this; at all events shipments to London are steadily decreasing.

The average quantities offered at the public auctions during the year amounted to 400 tons a week. In addition a large quantity of rubber was dealt with under forward contracts at prices ranging from 45 to 70 cents and a considerable quantity by private treaty. Forward sales covering deliveries in 1923, however, are few and unimportant. The quarterly stocks in Colombo go-downs were: March 31, 1922—5,100 tons; June 30, 1922—4,066 tons; September 30, 1922—4,855 tons; December 31, 1922—4,168 tons.

These figures do not include stocks on native owned rubber which are estimated not to exceed 1,000 tons at any particular date.

Shipments of latex have so far been small and mainly of an experimental nature.

Rubber Planting During 1922

As usual the wet weather brought in its train leaf and pod *Phytophthora.* Other root destroying fungi were as troublesome as in previous years but so far have caused no serious falling off in crops. However, constant vigilance and prompt treatment is always necessary. *Ustulina* is generally responsible for the most damage and it is feared its incidence will probably increase in the future, owing to cessation of soil tillage together with erosion, which have combined in exposing roots. Most estates have had to leave out manuring programs for three or four years, and although crops show no signs of serious falling off as yet foliage and bark renewals are beginning to give the first indications of distress.

No effective cure for Brown Bast has yet been evolved and the disease continues to cause anxiety. However, rational tapping methods, on soils and under climatic conditions best suited to rubber, result in a very low incidence of the disease.

Bud-grafting is attracting more notice as a result of lectures and demonstrations from the Agricultural Department.

Uniform rubber is still a problem, though the almost universal practice of bulking in conjunction with standardized coagulation has done much to improve rubber in this respect. However, more factory equipment and better facilities for transporting latex and coagulum are greatly needed.

Many estates are successfully taking up air-drying of rubber, owing to the scarcity and high price of fuel combined with the high cost of upkeep of drying machinery.

During the slump many estates made extra money by the manufacture of sole rubber, but the limited market has of late become overcrowded so that orders have fallen off very considerably.

The number of coolies dispatched to Ceylon during the year was 77,636, which is a good increase over the numbers recruited in former years.

Restriction in Ceylon

The exports of rubber licensed under the Ceylon rubber export restriction laws were 4,083 tons in November; 3,816 tons in December; 4,636 tons in January; in all 12,535 tons for the first quarter. That the amount for the next quarter will have to be much less is indicated by the announcement that the standard production for the year beginning November 1, 1922, for Ceylon will be 60,034 tons, whereas the standard production would have to be about 83,600 tons to permit a 60 per cent export amount to 12,535 tons a quarter.

Incidentally, the standard production for Ceylon, Malaya, and for Singapore and Penang is 60,034 tons, 270,000 tons, and 4,200 tons, respectively, and totals 334,234 tons. Excluding the production for Singapore and Penang, 60 per cent would be 198,020 tons. If to this is added 4,200 tons from the islands Singapore and Penang and if the Dutch colonies produce as much as was reported by them in 1922, 104,024 tons, the total amount of rubber available in 1923 from the sources mentioned will be about 306,244 tons. Adding surplus stocks and rubber from other sources, there should be well over 400,000 tons of rubber to draw from.

However, over against this must be placed the probable consumption which, if 1922 exports mean anything, show a very substantial increase. Thus Malaya exported 248,157 tons, Ceylon 47,367 tons, and Java and Sumatra 72,856 tons, which makes 368,380 tons from these places alone. If other plantation rubber and wild rubber exports are added, the total will be over 400,000 tons.

Netherlands East Indies

From data available it is possible to give a fairly accurate review of the rubber exports from the Netherlands East Indies during 1922. For that year the figures for Java are 31,659 tons; for East Coast Sumatra, 41,197 tons; of the other important rubber producing centers in these colonies, Bandjermassin exported 7,008 tons during the first 11 months, while the estimates for December are 1,000 tons, being a total of 8,008 tons. Riouw and dependencies shipped 3,664 tons up to November 1922; the December figures are estimated at 500 tons, so that the total is 4,164 tons; Pontianak's records for the same period show 2,337 tons plus an estimate for December of 350 tons, together 2,687 tons; Djambi exported 8,676 tons plus an estimated 1,000 tons for December, totaling 9,676 tons. Palembang shows 894 tons for the year, Sambas 1,936 tons, Sibolga 1,801 tons. From other less important parts of the archipelago 2,000 tons are considered to have been shipped. The total exports for the Netherlands East Indies were therefore 31,659 tons from Java and Madura, plus 41,200 tons from East Coast of Sumatra, plus 31,165 tons from other centers of the Dutch colonies in the East, altogether 104,024 tons. This constitutes a record figure, for in 1921 the total was 73,402 tons and in 1920, 76,750 tons. In 1919, 89,622 tons were exported.

It is interesting to note what part of these exports was native rubber. From Riouw and dependencies, 2,000 tons out of a total 4,164 tons were native rubber; from Bandjermassin 7,000 tons out of 8,008 tons; from Pontianak 1,687 tons out of 2,687 tons; from Palembang, Djambi, and Sambas all shipments consisted of native rubber. The total exports of native rubber during 1922 were 23,193 tons out of 104,024 tons, against about 6,000 tons out of 73,402 tons the year before.

Part of this considerable growth in exports of native rubber may be accounted for by the heavy increases during the last few months of 1922 when prices began to improve. Thus in the case of Djambi, Bandjermassin, Pontianak, and Palembang the exports during the last four months of 1922 in each case exceed more or less the amount shipped during the first eight months.

Rubber Estates in Sumatra

In June, 1922, Mr. Ris had an article in the *Archief voor de Rubbercultuur* in which he pointed out that 80,000 acres of Hevea in Sumatra were of inferior quality and produced only 300 pounds and less to the acre. This created quite a sensation especially amongst British planters in Sumatra who immediately took steps to have any new land planted with budded trees.

Not so long ago, therefore, any kind of rubber was planted anyhow in any kind of soil. On top of this, money was spent freely on all sorts of unnecessary things, magnificent factories and living quarters were built, and much time and money was given for the purpose of imparting a garden-like appearance to the plantations.

The slump, however, has taught its lesson. Hevea is not a garden product but a forest tree and no unnecessary prettinesses are allowed. Clean weeding, too, has been abandoned; young estates are planted with mimosa which forces out the *lalang*, while the older estates have *Centrosema* or *Vigna Oligosperma*.

By all these means it is endeavored to correct the evils of other days. However, not all of the defects can be remedied. Those estates that are in unfavorable locations will never yield more than 300 pounds per acre.

Fortunately, though there is not much of a future for these estates they have had a past. New and superior estates will come to 800 gilders an acre; the inferior old estates have cost only 500 to 600 gilders. They have had some fat years with high prices behind them and have been able to write off a good deal. In spite of this, of course, they are handicapped and the small weak concerns have a dubious future before them. One or two have already succumbed to circumstances and others may follow.

Rubber Export Tax

The rubber export tax is attracting a good deal of attention at present. These duties are levied on the prices ruling at the time of shipment; consequently, many firms who have made forward contracts at prices well below those prevailing at present will have to pay duty on the higher rate and will therefore suffer considerable loss.

Companies who are liable for excess profits tax do not have to take this into consideration as compensation is given for the export duties paid. The unfortunate companies who do not make excess profits and have forwarded contracts at prices below those quoted on the day of shipment stand a chance of having to pay more duty than the prices realized warrant. Accordingly efforts are being made to induce the authorities to substitute a fixed duty for the sliding scale now in use.

Java Production Statistics

Comparative statistics for the production of the estates in Java, Madura and the Outer Possessions from January up to and including October, 1920, 1921, and 1922:

During 1920, a total of 22,162,559 kilos were produced by 264 estates in Java and Madura. This amount was reduced to 17,984,771 kilos during 1921; that is 81.2 per cent of the previous period. However, during 1922 an increase to 20,700,410 kilos, or 93.4 per cent was recorded. The decrease in 1921 assumed largest proportions during the latter half of the 10 months under review; on the other hand there was a steady increase in 1922. In spite of this, more estates stopped work in 1922 than in 1921, 44 against 29.

The most important rubber districts in Java are the Preanger Regencies—61 estates: production, 4,768,541 kilos in first 10 months of 1920; 3,655,894 kilos in 1921, and 4,029,633 kilos in 1922; Besoeki—49 estates: production, 4,582,772 kilos, 3,950,159 kilos, 4,828,811 kilos respectively; Pasocroean—44 estates: production, 5,313,348 kilos, 4,366,861 kilos, 4,511,161 kilos, respectively; Batavia—32 estates: production, 2,342,334 kilos, 1,804,282 kilos, 2,544,963 kilos, respectively; Kediri—21 estates: production 1,386,-233 kilos; 1,099,632 kilos, 1,306,626 kilos, respectively; Bantam—14 estates: production, 1,585,024 kilos, 1,299,957 kilos, 1,324,212 kilos, respectively.

Of the more important districts only Besoeki and Batavia increased their outputs during 1922, this in spite of the fact that in Batavia 8 estates stopped tapping during 1922 against 5 in 1921.

In the Outer Possessions 158 estates produced 22,962,165 kilos in 1920, 20,435,081 in 1921, or 89 per cent of the 1920 output; while in 1922 the figures were 23,582,138 kilos, or 103 per cent of 1920.

Of these 158 estates 116 are in East Coast of Sumatra. They produced 18,355,480 kilos in 1920, 16,230,444 in 1921, and 18,655,510 kilos in 1922. Atchin and dependencies have 12 estates: production, 1,357,028 kilos, 1,401,508 kilos, 1,622,374 kilos, respectively. In Tapanoeli (Sumatra) there are 5 estates: production, 836,222 kilos, 779,087 kilos, 853,007 kilos, respectively. Lampong—7 estates: production, 961,662 kilos, 899,396 kilos, 1,057,265 kilos, respectively. Riouw and Dependencies—6 estates: production, 786,984 kilos, 652,171 kilos, 885,246 kilos, respectively. Borneo—7 estates: production, 491,597 kilos, 339,765 kilos, 312,414 kilos, respectively.

Except in Borneo, all the districts named showed some increase in the 1922 output as compared with 1920. In the East Coast of Sumatra only 5 estates stopped tapping, and in Atchin only 1. On the entire 158 estates only 8 stopped in 1921 and 10 in 1922.

Concerning the yields of the individual estates, the 1921 tables further show that in Java and Madura 23 estates produced up to 50 per cent and 56 from 50 to 75 per cent. The following year only 10 produced up to 50 per cent and 41 from 50 to 75 per cent.

In the Outer Possessions, in 1921, 9 estates had an output up to 50 per cent and 44 between 50 and 75 per cent, against 6 estates up to 50 and 14 between 50 and 75 per cent during 1922.

Recent Patents Relating to Rubber

The United States

Issued* March 6, 1923

NO. 1,447,281 Fountain pen. C. P. Crawford, Los Angeles, Calif.
1,447,365 Cushion wheel. G. Walther, Dayton, Ohio.
1,447,367 Sanitary napkin supporter. C. B. Williams and S. F. Barker, Buffalo, N. Y.
1,447,521 Automobile tube. J. Schwab, Winnipeg, Manitoba, Canada.
1,447,547 Tire tread. T. A. Hackley, Seattle, Wash.
1,447,656 Rubber darning horn. B. M. Gingels, Waukesha, Wis.
1,447,739 Combined cushion and pneumatic tire and rim therefor. E. E. Thrasher, Cumberland, Md.
1,447,784 Resilient tire. E. G. Hulse, assignor to Kelly-Springfield Tire Co.—both of Cumberland, Md.
1,447,790 Filling device with rubber cap for fountain pens. T. Kovacs, Berlin, Germany.
1,447,848 Toy balloon. L. R. Holycross and R. W. Martin, Columbus, Ohio; said Martin assignor, by mesne assignments to said Holycross.
1,447,864 Cushioned wheel. M. F. Kettler, Pittsburgh, Pa. (Original application divided.)
1,447,904 Abdominal supporter. I. B. Sinclair, Bass Point, Mass.
1,447,924 Tire valve. A. V. Chylowski, Detroit, Mich.

Issued* March 13, 1923

1,447,979 Armored tire. W. G. Hawkins and V. C. Bloodgood, Harvey, and J. F. Donnellan, Chicago—both in Ill.
1,448,049 Rubber heel and fastening. H. L. Beal, Brookline, Mass.
1,448,168 Tire and engine gage. J. M. and H. Trusty, Core Madera, Calif.
1,448,180 Composite laminated structure. H. N. Atwood and G. B. Bains, 3rd, Reading, Pa., assignors, by direct and mesne assignments, to Rubwood, Inc., Lawrence, Mass.
1,448,309 Nursing bottle. J. May, assignor of ½ to J. McPhee—both of Portland, Oreg.
1,448,527 Life belt. S. P. Edmonds, Brooklyn, N. Y.
1,448,551 Trousers supporter. M. Leux, assignor to C. Kurlander—both of St. Louis, Mo.

Issued* March 20, 1923

1,448,970 Combination garment supporter. W. J. Leverence, Elkhart, Ind.
1,449,010 Air valve leakage detector for pneumatic tubes. F. E. Lindbloom, Tacoma, Wash.
1,449,096 Fountain comb. F. M. Grieten, assignor of ¼ to C. T. Anderson —both of Baltimore, Md.
1,449,116 Combination railway wheel and road tire. E. P. Hendrick, Newtonville, Mass.
1,449,117 Combination railway wheel and road tire. E. P. Hendrick, Newtonville, Mass.
1,449,130 Fountain pen. M. J. Senz, Port Angeles, Wash.
1,449,209 Pneumatic ball valve. R. M. Zimmerman, assignor of ½ to G. Z. Daniels—both of Milwaukee, Wis.

Issued* March 27, 1923

1,449,456 Rubber impregnated traction devices for tires. C. R. Stewart, Akron, O.
1,449,498 Cushion heel. T. M. Conger, Elyria, O.
1,449,549 Cushion tire. L. E. Ray, Oil Trough, Ark.
1,449,582 Tire casing. L. Brown, assignor to J. F. Vinson, both of Willow, and L. R. England, Carter—both in Okla.
1,449,602 Plate for rubber heel. G. P. Hogan, Chicago, Ill.
1,449,692 Inner tube for pneumatic tires. R. Nall, Oakland, Calif.
1,449,743 Armored tire. J. Berger, New York City.
1,449,799 Fountain pen. C. W. Williamson, North Grafton, Mass.
1,449,920 Cushioned wheel. C. O. Stanley, assignor of ½ to J. M. Andrews —both of Buffalo, N. Y.
1,450,096 Inner tube. T. J. McCaffrey, Seattle, Wash.

The Dominion of Canada

Granted February 20, 1923

228,896 Pneumatic tire casing spreader. The Weaver Manufacturing Co., assignor of I. A. Weaver and R. G. Stoeher—all of Springfield, Ill., U. S. A.

Granted February 27, 1923

228,972 Airship. T. Barrett, Pasadena, Calif., U. S. A.
228,981 Pneumatic heel. E. Borman, Chicago, Ill., U. S. A.
229,057 Hose supporter with rubber button. E. A. Lillie, Leicester, England.
229,086 Inner tube. H. C. Privett, Los Angeles, Calif., U. S. A.
229,107 Sanitary syringe. H. C. H. Sprague, Winnipeg, Manitoba.
229,111 Device for practicing golf. T. R. Stokes, Wadebridge, Cornwall, England.
229,135 Inner tube. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignor of R. E. Stephenson, Indianapolis, Ind., U. S. A.
229,137 Heel for footwear. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of E. C. Heilbecker, Bristol, R. I., U. S. A.
229,155 Airship. The Goodyear Tire & Rubber Co., Akron, Ohio, assignee of R. H. Upson, New York City—both in the U. S. A.

Granted March 6, 1923

229,262 Cushioned auto wheel. L. Duchesneau, R. Arsenault and M. Phillips, co-inventors—all of Cap Madeleine, Quebec.
229,271 Corset with elastic insert. L. J. A. Amyot, Quebec.
229,291 Electrically insulating tape. H. I. Diamond, Atlanta, Ga., U. S. A.
229,294 Garment hanger. I. Duberstein, Los Angeles, Calif., U. S. A.
229,351 Pneumatic tire valve. H. F. Richter, Los Angeles, Calif., U. S. A.

Granted March 13, 1923

229,473 Resilient core for motor tires. G. A. H. Robbins and S. F. E. Einsiedel, co-inventors—both of Brisbane, Queensland, Australia.
229,477 Tire. W. Beaney, New York City, U. S. A.
229,511 Rubber bale. E. Hopkinson, New York City, U. S. A.
229,545 Cushion heel. A. K. Pomerey, Williamstown, N. J., formerly of Rockville, Md.—both in the U. S. A.

The United Kingdom

Published March 7, 1923

191,545 Solid rubber band tire. E. B. Killen, 27 Queen Victoria street, London.
191,556 Wheel with rubber buffers. I. W. Burns-Lindow, Yair, Selkirk.
191,578 Stair treads. R. J. Borthwick and T. E. Bjerre, 11 Bothwell street, Glasgow, Scotland.
191,608 Rubber-faced patch for tire covers. C. L. Cuthbe, 37 Great Eastern street, London.
191,613 Rubber roller for wringing-machines, typewriters, etc. T. Domoto, 330 Front street, San Francisco, Calif., U. S. A.
191,643 Rubber hot water bottle. R. W. Sampson, Malba, Long Island, New York, U. S. A.
191,656 Hose-supporter with rubber button. C. J. Hazelton, 15 Union street, Worcester, Mass., U. S. A.
191,697 Surgical syringe nozzles. J. W. Friedman, 220 West 98th street, New York City, U. S. A. (Not yet accepted.)
191,739 Unvulcanized rubber for tires. H. Debor, 55a Zielstattstrasse, Munchen, Germany. (Not yet accepted.)
191,803 Rubber compound fabrics. R. Russell, Strathmoor, Lands End, Rhodes, Lancashire.

Published March 14, 1923

191,867 Agglutinated fiber fabrics. G. E. Andrew, 130 Green Lane, Northwood, Middlesex.
191,904 Rubber heel for horseshoes. S. Carter, Sunbeam House, Ryton Bulkington, near Nuneaton.
191,907 Portable foot pump. J. F. Cooper and Industrial Rubber Products Limited, Brook House, Tottenham Court Road, London.
191,954 Wooden toy animals with rubber heads. M. A. Holmes, 49 Deansgate, Manchester.
192,018 Pneumatic cushion for arrow heads. R. P. Orr, 35 South Manning Boulevard, Albany, N. Y., and F. Samuelson, 27 North Midland avenue, Arlington, N. J.—both of the U. S. A.

Published March 21, 1923

192,121 Footballs. D. Cunningham, 14 Bridge street, Coleraine, Co., Derry.
192,201 Molded rubber pencil holder. J. Salz, 141 West 17th street, New York City, U. S. A.
192,209 Elastic attachment for corsets. B. Holmes, 90 Stockport Road, Levenshulme, Manchester.
192,211 Cushion tire. A. E. White, 88 Chancery Lane, London; B. F. Goodrich Co., 1780 Broadway, New York City, U. S. A.
192,230 Sponge rubber block supports for furniture. J. C. Spencer, 2 Central Buildings, Westminster.
192,246 Spring tire. A. E. Gladu, 48 Friend street, Lynn, Mass., U. S. A.
192,286 Rubber floor-grips for rugs. C. J. Watts, Hessary, Leigh Road, Southampton.

New Zealand

Published December 30, 1922

47,460 Pneumatic tire cover. A. M. Perry, Epsom, Auckland.

* Under Rule No. 167 of the United States Patent Office, the issue closes weekly on Thursday, and the patents of that issue bear date as of the fourth Tuesday thereafter.

Chemical Patents will be found on page 500, Machinery and Process Patents on pages 505-506

Published February 8, 1923

48,057 Rubber-lined tire cover. Michelin et Cie, assignee of E. E. Michelin, Rue du Nord, both in Clermont-Ferrand (Puy-de-Dome), France.

48,562 Inner tube for tires. J. B. Salmon, 92 Filleul street, Dunedin.

Germany

Design Patents Issued with Dates of Issue

837,729 (January 24, 1923). Rubber sole with firm, non-elastic lining. Otto Heidenreich, Memel; represented by Willy Bollmann, Bardesholm, in Holstein.

837,790 (January 2, 1923). Vaginal cleaner of sponge rubber, with a hole in the center and with tube insert for holding a pipe or the like. Karl Berg, Hauptstätterstrasse 87, Stuttgart.

837,800 (January 12, 1923). Rubber sole plate. Fr. Emers & Co. (Proprietor, A.-G. für Kartonnagen-industrie.) Lübeck.

837,889 (December 18, 1922). Frame cloth of rubber. Fa. Carl Plaat, Köln-Nippes.

837,968 (January 15, 1923). Rubber sole with wire inlay. Willy Schnurr, Sedanstrasse 45, Erfurt.

837,983 (July 30, 1921). Vaginal syringe. Emil Spardel, Auf den Blöcken 12, Hamburg.

838,132 (January 20, 1923). Ear and nose cleaner of sponge rubber with rubber tube insert. Karl Berg, Hauptstätterstrasse 87, Stuttgart.

838,133 (January 20, 1923). Vaginal cleaner. Karl Berg, Hauptstätterstrasse 87, Stuttgart.

838,453 (September 14, 1922). Injection syringe with hollow piston. Dr. Wilfried Dobers, Jena.

838,949 (January 10, 1923). Rubber foot for prothesis. Gummiwerk Ernst Kniepert, Löbau i. S.

839,051 (January 29, 1923). Tag and string with rubberized ends. Fritz Thümmler, Schanzenstrasse 20, Düsseldorf-Oberkassel.

Patents Issued, with Dates of Issue

372,495 (January 18, 1922). Tire for automobiles and similar vehicles. Francisco Rosete, Tulancingo, Mexico, represented by Tenenbaum and Dr. Hermann, Berlin S. W. 68.

372,698 (April 29, 1922). Exchangeable rubber tread patch. Georg Hapelt, Ankerstrasse 8, Halle a. S.

372,943 (January 21, 1919). Syringe with container for medications. Vereinigte Bornkesselwerke m. b. H., Berlin.

372,944 (September 15, 1921). Sanitary syringe. Dr. Josef Lehrs, Gotzkowskystrasse 19, Berlin.

372,945 (June 21, 1922). Pocket inhaler. Rudolf Clad, Amalienstrasse 6, Kottbus.

373,344 (December 2, 1921). Rubber heel patch. Max Götze, Biesterstrasse 6, Hannover.

373,455 (September 28, 1921). Preservative, finger-stall or the like. Julius Jacobson, Oranjenstrasse 24, Berlin.

373,484 (July 2, 1921). Anti-skid device. Charles Moss, Manhattan, United States; represented by: Ranfft, Berlin S. W. 61.

Trade Marks

United States

Two Kinds of Trade Marks Now Being Registered

Under the rules of the United States Patent Office, trade marks registered under the Act of February 20, 1905, are, in general, fanciful and arbitrary marks, while those registered under the Act of March 19, 1920, Section 1 (b), are non-technical, that is, marks consisting of descriptive or geographical matter or mere surnames. To be registered under the latter act, trade marks must have been used for not less than one year. Marks registered under this act are being published for the first time when registered, any opposition taking the form of an application for cancellation.

Granted March 6, 1923, Act of February 20, 1905

165,064 REGAL, arched and with a suggestion of a scroll at either end—elastic web. Marshall Field & Co., Chicago, Ill.

165,065 IMPERIAL BRAND—elastic web. Marshall Field & Co., Chicago, Ill.

165,068 GRIZZLY GRIP—self-vulcanizing or cold tube patch for automobile and motorcycle inner tubes. 20th Century Tire Protector Co., Midlothian, Texas.

165,078 TRUSTY—rubber or rubber and fabric tires for vehicles. Racine Rubber Co., Racine, Wis.

165,155 KOLD-STICK; fanciful arrangement of white letters on black background—waterproof fibrous sheet roofing. Friend Brothers Co., Sioux City, Iowa.

165,161 Representation of the moon, with face; around it, above, the words: MOON-SHINE, and below, the words: TIRE-PATCH—sheet rubber patches. Harry L. Roemer, doing business as Centralia Patch Co., Centralia, Ill.

165,169 Representation of a stone, irregularly oblong in shape, white on a circular black background, with white radii in long and short lengths alternately; on the stone the word: FIRESTONE, in black letters—tires of rubber or rubber and fabric, inner tubes and accessories. The Firestone Tire & Rubber Co., Akron, Ohio.

165,170 SAVOLD—rubber tires of all kinds. Solomon H. Goldberg, Chicago, Ill.

165,171 Two circles as of tubing, one within the other, and at the center of the smaller a lion's head and front paws—rubber tires. The Standard Tire Co., Willoughby, Ohio.

165,223 A heavy letter D, with a black oblong bar diagonally across it—pneumatic tire casings. Dunbar Tire & Rubber Co., Dunbar, W. Va.

165,227 MONOGRAM, above a frame enclosing W. C. Q. Co. arranged in a monogram—inner tubes, inner tube patches, and blowout patches. W. C. Quarles Co., Inc., Richmond, Va.

165,297 Fanciful picture of a child—boots, shoes, and slippers of leather, rubber, and fabrics. Thomas G. Plant Co., Boston, Mass.

165,299 Regal, the lower part of the R & G extended to form part of an underscoring line—tires and inner tubes. Leo L. Chadwin, doing business as Chadwin Tires & Rubber Co., Philadelphia, Pa.

165,310 A large figure 3 with the word "MORE" embraced in it—elastic webbing. Pena Rivet Corp., Philadelphia, Pa.

165,318 COUNTERBALANCE—rubber heels. Counterbalance Rubber Heel Co., Elyria, Ohio.

165,331 ARCHWAY—boots and shoes made wholly or in part of leather, canvas, or textile fabrics. Edwin Clapp & Son, Inc., East Weymouth, Mass.

165,353 DOMINO, black letters on a white background outlined in the shape of a mask, the letters being graduated in size from the ends to the large M in center—rubber heels. New York Belting & Packing Co., New York, N. Y.

165,355 LU-KO, white letters on a black background which is the upper half of an oval, the lower half being white—buttons, elastic webbing and toilet pins. L. H. Lewis Co., Dallas, Texas.

165,377 DU-ALL, fanciful arrangement of shaded letters, underscored with double line which connects with the A—portable vulcanizers. The Du-All Manufacturing Co., Cleveland, Ohio.

165,382 Fanciful arrangement of the words "PUT YOUR MONEY AND TAKE YOUR MDSE"—automobile tires of rubber and fabric, all-rubber patches, rubber inner tubes, blowout patches of rubber and fabric, and hook and lace on boots of fabric and rubber. Robert E. McCaughn, doing business as The Put and Take Co., Memphis, Tenn.

165,395 ADDO-PAD—elastic girdles and elastic negligee hose supporters. B. & R. Manufacturing Co., West Hoboken, N. J.

165,412 ZULU—hose made of rubber reinforced with fabric. The B. F. Goodrich Co., New York, N. Y.

165,418 VALOR—rubber fabric or rubber and fabric tire casings and inner tubes. The Ashland Tire & Rubber Co., Ashland, Ohio.

165,420 MASCOT TIRE, the head of a goat separating the two words, the background being outlined to represent a section of tubing—rubber tires. American Wholesale Corp. (Baltimore Bargain House), Baltimore, Md.

Granted March 6, 1923, Act of March 19, 1920, Section 1(b)

165,235 On a fanciful background the words: "DOES DOUBLE DUTY" above the letters D U O so arranged that the U serves as a connecting link for the D and O—combs made of hard rubber, celluloid, horn, etc. Sanitary Comb Co., Inc., New York, N. Y.

165,242 AMERICAN, in very large black letters—tires and tubes of rubber and rubber composition and patches and plasters thereof. The American Rubber & Tire Co., Akron, O.

165,245 MANHATTAN—rubber tires and tubes. The Columbia Tire & Rubber Co., Mansfield, Ohio.

Granted March 20, 1923, Act of February 20, 1905

165,723 THE GARROD SHOE; black letters on white oval background THE GARROD being in script, with the last stroke of the d turned back to underscore the word—shoes of rubber, leather, cloth, and fabric. The Garrod Shoe Co., Inc., New York, N. Y.

165,732 Representation of a heel studded with black disks, in the center a wreath surrounding the letter F; beneath this the word: FRESCO—rubber heels. Abraham Freedman, doing business as The Fresco Rubber Co., Troy, N. Y.

165,855 Representation of a runner; behind him the word: MARATHON, the whole surrounded by a double outline in shape of a tire on which are the words: MARATHON WASHABLE FLEXYDE—certain named baggage, portfolios, and pocketbooks. The Marathon Tire & Rubber Co., Cuyahoga Falls, Ohio.

Granted March 20, 1923, Act of March 19, 1920, Section 1(b)

165,904 PETAL TOP—corsets, girdles, hose supporters, etc., American Lady Corset Co., Detroit, Michigan.

165,922 OLDFIELD—letters in double outline—tires and tubes of rubber or rubber and fabric. The Oldfield Tire Co., Akron, Ohio.

165,926 In an oblong block the words: "ALLWEATHER" Coat, then a helmet and shield separating the words: SERVICEABLE AND DEPENDABLE; on the shield a large B on which is a small R, and Co. beneath; at bottom the words: REGISTERED TRADEMARK—raincoats and waterproof garments. The Badger Raincoat Co., Port Washington, Wisconsin.

165,939 MARSHALL—elastic hernial trusses. Cherterman Leeland Co., Philadelphia, Pa.

Granted March 27, 1923, Act of February 20, 1905

165,949 "GUMMITE"—plastic material similar in uses and application to casein products and phenol condensation products. Compagnie General d'Electricite, Paris, France.

165,952 SORBO—goods of india rubber, gutta percha, and sponge substitutes, belting for machinery, hose, machinery packing, gaskets, and tires. Sorbo Rubber-Sponge Products, Ltd., Woking, England.

165,954 "WEAR IS THERE," in script—boots, shoes, and slippers of leather, rubber, or canvas, or combinations of same. B. Rosenberg & Sons, Inc., New Orleans, La.

166,029 On a small shield the letter F outlined—heels and soles made of or containing rubber. The Firestone Tire & Rubber Co., Akron, Ohio.

166,052 On a circular background shaded with straight lines, three shields, one bearing a cross, one the letter S, and one the letter T—sanitary napkins and hospital supplies, namely, rubber sheeting, rubber gloves, gauze, hot water bottles, etc. Swiss Textile Co., Inc., New York, N. Y., and Assonet, Mass.

166,065 JULIA MARLOWE—ladies' shoes made wholly or in part of leather, rubber, canvas, or other fabrics. The Rich Shoe Co., Milwaukee, Wis.

166,083 "YE OLDE BRICK," on a black background representing the sole of a shoe having a row of white stitching around the edge—misses', boys', and children's shoes of leather, rubber, fabric, or combinations. Jordan Marsh Co., Boston, Mass.

166,098 POGO—shoes for men, women and children, of leather, rubber, fabric, and combinations of same. Brown Shoe Co., Inc., St. Louis, Mo.

166,109 INRGARD, large black letters graduated in size, the largest at ends and converging to the extra large G in center—tire reinforcements of fabric and cement. The American Automobile Accessories Co., Cincinnati, O.

166,111 BAKER, in fancy lettering—children's and women's shoes of leather, canvas, and combinations of leather and rubber and of canvas and rubber. George W. Baker Shoe Co., Brooklyn, N. Y.

166,125 ADBEE, in small lettering, slightly curved—infant pacifiers. Samuel D. Kramer, doing business as Kramer Novelty Co., New York, N. Y.

166,134 FLEXO—flexible rubber lens-supporting gaskets in headlights of automobiles, electric cars, etc. Flexo Lens Protector Co., Camden, N. J.

166,157 PURITAN, slightly curved over a large P which serves as the initial letter for the words: PURITAN PRODUCTS PROTECT, written one above the other; in smaller type the words: MADE BY BEYERLE, NEW YORK, U. S. A.—Infants bibs, house aprons, bathing caps, and baby pants. J. J. Beyerle Mfg. Co., New York, N. Y.

166,243 INCA—pads of rubber or rubber composition for application to boots and shoes. Blakey's Boot Protectors, Limited, Leeds, Eng.

166,263 RADIO, enclosed in black line border, from which zigzag lines dart; the whole enclosed in oval with black line border—footwear of rubber, canvas and rubber, and of canvas, leather and rubber. Cambridge Rubber Co., Cambridge, Mass.

The United Kingdom

Published March 7, 1923

427,249 Within an oblong, double-ruled border, the word: OVERGROUND, the initial and final letters being large capitals; beneath this a design comprising a red, white, and blue background and the representation of a double triangle merging at the center, as, for instance, in the two loops of a bow-tie—goods of india rubber and gutta percha, Class 40 exclusively. The Beldam Tyre Co., (1920) Limited, Windmill road, Brentford, Middlesex.

430,391 SUPP—india rubber tires. Edward Brice Killen, 27 Queen Victoria street, London, E. C. 4.

Published March 14, 1923

429,737 URIT—elastic webbing and elastic cord, included in Class 40. Joseph Fellner, 12 and 12a Roscoe street, Golden lane, London, E. C. 1.

429,812 EVERLASTIC—inner tubes for tires. St. Helen's Cable & Rubber Co., Limited, The Electric Cable & Rubber Works, Bank Quay, Warrington.

B432,173 ZIG-ZAG—footballs. William Sykes, Limited, The Yorkshire Athletic Manufactory, Westfield road, Horbury, Yorkshire.

Published March 21, 1923

432,921 IRAX—hats and caps, raincoats and mackintoshes. The Wigston Hat Co., 41 Canal street, South Wigston, Leicestershire.

Published March 28, 1923

427,777 Within a circle the representation of a double row of teeth and a hand polishing them with a dental instrument. Above, the word: PERUS, and below, the word: DENTAL—dental supplies, including dental india rubber and gutta percha, instruments, etc., being all goods included in Class 11. Paul Buss, Limited, 36 King street, Manchester.

427,778 "PERUS"—dental supplies, including dental india rubber and gutta percha, instruments, etc., all included in Class 11. Paul Buss, Limited, 36 King street, Manchester.

430,426 POWERPLUS—repair outfits included in Class 50, for india rubber tires and tubes. Haslam & Stretton, Limited, 11 Windsor Place, Cardiff.

430,694 Representation of a mermaid rising out of the water, and the word: MERMAID—waterproofing compounds for textiles. Jesse Ainsbury, 66-67 High street, Dudley.

431,227 Representation of the head and shoulders of a negro girl bedecked with jewels; beneath this the words: THE LAUGHING GIRL, in white letters on a black background; beneath this in very small black letters on white background the firm name and address—goods of india rubber and gutta percha in Class 40 exclusively. Naamlooze Vennootschap Handelmattschappij Voor Heen J. F. Sick & Co., Leeuvehaven, 153b, Rotterdam, Holland.

431,544 NITREX—a preservative dressing for india rubber tires. The Sterling Varnish Co., Inc., Fulton Buildings, Sixth street and Duquesne Way, Pittsburgh, Pennsylvania, U. S. A. For service in the United Kingdom address in care of Sterling Varnish Co., 196 Deansgate, Manchester.

431,684 THE "VITALITE" TENNIS AND SPORTS SHOES, the words being arranged in four lines, and "VITALITE" being in display type—tennis and sports shoes. The Vitalite Sock Co., Limited, 50a Plevna Road, South Tottenham, London, N. 15.

431,958 SPUR—goods of india rubber or gutta percha in Class 40 exclusively. James Grose, Limited, 4 Old Jewry, London, E. C. 2.

432,239 PARABEX—Goods of india rubber or gutta percha in Class 40 exclusively. The British Xylonite Co., Limited, Hale End, London, E. 4.

432,653 PATTINSONITE—a product of carbonate of magnesia in powder form included in Class 1, for use in the manufacture of india rubber. The Washington Chemical Co., Limited, Washington Station, Durham.

433,025 STYLASTIC—corsets, suspenders, and the like. Weingarten Brothers, Limited, Frensham road and Goldsmith avenue, Milton, Portsmouth, Hampshire.

The Dominion of Canada

Registered

32,798 Device of a flag with the word "BELDAM" thereon, and underneath this the firm name, all enclosed in a rectangular border—engine and machine packings, jointings, hose, and asbestos goods. The Beldam Packing & Rubber Co., Limited, 29 Gracechurch street, London, E. C., England.

32,801 CORDATIC—general. Hungarian Rubber Goods Factory, Limited, Budapest, Hungary.

32,803 Band of white rubber of varying width which runs longitudinally of the belt at one side of the central plane thereof—rubber belting. Canadian Consolidated Rubber Co., Limited, Montreal, Canada.

32,853 Word: "LETO" in a circle—rubber tires, tubes, and casing. The Norwalk Tire & Rubber Co., Norwalk, Conn.

32,880 TREOTEX—elastic webbing. Treo Co., Inc., Jamaica, N. Y.

32,891 Representation of a staff and serpent surmounted by a crown—rubber goods for chirurgical and hygienic purposes, instruments and apparatus for dental, surgical, and veterinary use and in pharmacy, hospital supplies, cutlery, and sharpening devices for use in surgery. Aktiengesellschaft für Feinmechanik Vormals Jetter & Scheerer, Tuttlingen, Germany.

32,907 "BLACK DIAMOND" upon a diamond-shaped panel—friction tape, rubber tape, rubber-covered copper wire and cables, electrical supplies (not including dry cell batteries), etc. The James Moncur Electric Co., Hamilton, Ontario.

32,920 Word: "STA-SLATE"—roofing, building papers, and shingles. The Ruberoid Co., Limited, Montreal, Quebec.

32,921 Word: "WIGWAN"—roofing, building papers and shingles. The Rubberoid Co., Limited, Montreal, Quebec.

32,937 "ACME"—tire casings and tubes, liners, blow-out shoes, patches, repairing materials, cement, automobile covers, weather stripping and tape. Dunlop Tire & Rubber Co., Limited, Toronto, Ontario.

Designs

The United States

Issued* March 13, 1923

62,055 Nonskid Tire Tread. Term 14 years. Elmer N. Downes, assignor to McClaren Rubber Co., both of Charlotte, North Carolina.

62,056 Nonskid Tire Tread. Term 14 years. Elmer N. Downes, assignor to McClaren Rubber Co., both of Charlotte, North Carolina.

62,064 Tire Casing. Term 14 years. William Edgar McCormish, Niles, Ohio, assignor to Charles Herbert Booth, Youngstown, Ohio.

62,065 Tire Casing. Term 14 years. William Edgar McCormish, Niles, Ohio, assignor to Charles Herbert Booth, Youngstown, Ohio.

62,055 62,056 62,064 62,065 62,066 62,067 62,114

62,066 Tire Casing. Term 14 years. William Edgar McCormish, Niles, Ohio, assignor to Charles Herbert Booth, Youngstown, Ohio.

62,067 Tire Tread. Term 14 years. William E. McCormish, Cuyahoga Falls, assignor to The American Tire Corporation, Cleveland, both in Ohio.

Issued* March 27, 1923

62,114 Tire Tread. Term 3½ years. Warren H. Buckley, Washington, D. C.

* Under Rule No. 167 of the United States Patent Office, the issue closes weekly on Thursday, and the patents of that issue bear date as of the fourth Tuesday thereafter.

The Dominion of Canada

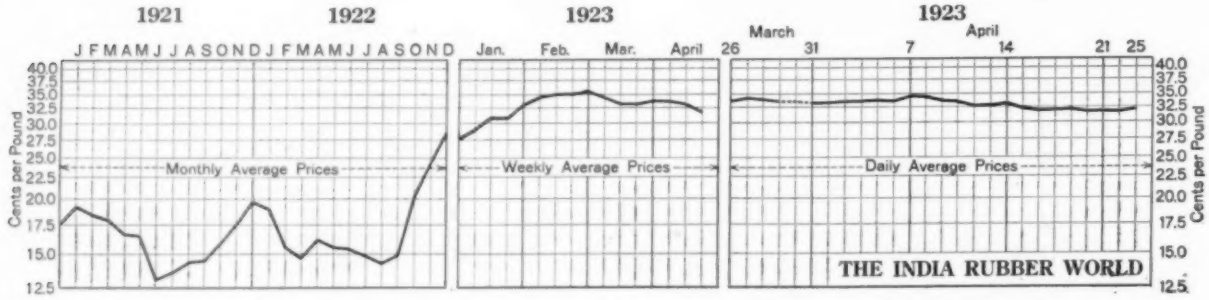
Registered

5,696 Pads for heels of boots or shoes. John G. Lennox, Montreal, Quebec.

5,697 Pads for heels of boots or shoes. John G. Lennox, Montreal, Quebec.

5,698 Pads for heels of boots or shoes. John G. Lennox, Montreal, Quebec.

5,699 Pads for heels of boots and shoes. John G. Lennox, Montreal, Quebec.



Ratio Graph of New York Market Fluctuations—Average Prices of Spot Ribbed Smoked Sheets

Review of the Crude Rubber Market

New York

NEW YORK average spot price for ribbed smoked sheets was 33½ cents on March 24. One month later, April 25, it was 31¾ to 32 cents. The general decline for the month as shown by the graph was also relieved on April 6 and 7, when the high for the month, 34¼ cents, was reached.

The features of the spot market by weekly periods were as follows:

During the week ended March 31, the market was extremely dull, with very little trading or factory buying. The last two days of the week were Easter holidays in London, during which time no change occurred in New York prices, the market closing at 33¾ cents.

The market for the week ended April 7 was quiet, with very little activity in the absence of consuming demand until late in the week, when the price reached 34 cents and trading became more spirited.

The week ended April 14 opened with a strong market but heavy selling caused a decline until Saturday, when the market became steadier and some buying interest was evident. The closing price for the week was 32¾ cents.

During the week ended April 21 the market was very erratic, fluctuating with a narrow range in sympathy with London market conditions. There was a fair amount of trading among dealers but only odd lot buying by the factories. The closing price of the week was 31¾ cents. Rumor indicated the drop as due to liquidation in London.

Early in the succeeding week the market gained strength, reflecting activity in London caused by purchases of large American consuming interests.

Fine Pará dropped from 30 cents March 31 to 28½ cents, April 25. Other South American grades declined in proportion.

Imports of all grades during March, 1923, were 33,916 tons, compared with 28,702 tons one year ago. Plantation arrivals for March, 1923, were 31,672 tons, compared with 27,711 tons one year ago. Total importations of all grades for three months ended March 31, were 89,333 tons, compared with 79,542 tons for the corresponding period of last year.

Spot and future quotations on standard plantation and Brazilian grades were as follows:

PLANTATIONS. April 2, Spot first latex crêpe, 33¼-33½ cents; May-June, 33½-33⅝ cents; July-Sept., 34⅛-34¼ cents; July-Dec., 34⅛-34¾ cents. April 25. Spot first latex crêpe, 32¼-32⅜ cents; May-June, 32⅛-32½ cents; July-Sept., 32⅝-32¾ cents; July-Dec., 33¼-33⅜ cents.

April 2. Spot ribbed smoked sheets, 33¼-33½ cents; May-June, 33½-33⅝ cents; July-Sept., 34¼ cents; July-Dec., 34¾ cents. April 25. Spot ribbed smoked sheets, 31¾-32 cents; May-June, 32¼ cents; May-Sept., 32¼ cents; July-Dec., 32¾ cents.

April 2. Spot No. 1 amber crêpe, 32½ cents; May-June, 33¼ cents; July-Sept., 34¼ cents. April 25. Spot No. 1 amber crêpe, 31½-31¾ cents; May-June, 31¾ cents; July-Sept., 32 cents.

April 2. Spot No. 1 rolled brown crêpe, 30 cents; May-June, 30½ cents; July-Sept., 31 cents. April 25. Spot No. 1 rolled brown crêpe, 29 cents; May-June, 29¼ cents; July-Sept., 29½ cents.

SOUTH AMERICAN PARÁS AND CAUCHO. April 2. Spot, upriver fine, 30¼ cents; islands fine, 29¾ cents; upriver coarse, 27 cents; island coarse, 16 cents; Cametá, 16 cents; caucho ball, 29 cents. April 25. Spot, upriver fine, 28½-28¾ cents; islands fine, 27½ cents; upriver coarse, 25½-26 cents; islands coarse, 14¾ cents; Cametá, 15⅛ cents; caucho ball, 26½-27½ cents.

London

The week ended March 31 opened at 16¼ pence and rose to 16¾ pence at mid-week, returning to 16¼ pence at the week-end. From this point prices ranged steadily upward, closing at 16⅞ pence the week of April 7. The week of April 14 opened at 16⅞ and closed at 16⅝ pence, the decline being practically unbroken by a rise. The week ended April 21 opened at 16⅝ pence and declined sharply to 15½ pence on Friday. Early the following week large American purchases caused the market to advance to 15¾ pence. A steady decrease is reported in London stocks, which on April 9 were 63,349 tons and one week later were 61,723 tons.

New York Quotations

Following are the New York spot quotations per pound, for one year, one month ago, and April 25, the current date:

Plantation Hevea	March 27, 1922	March 26, 1923	April 25, 1923
LATEX			
Rubber latex (Hevea)*gal.*	@	$1.25 @1.35	$1.25 @$1.35
CREPE			
First latex	.14½ @	.33½ @.33¾	.32¼ @.32⅜
Off latex	.14 @	.33¼ @.33½	.32 @.32½
Amber No. 1	.14 @.14½	.32¾ @.33	.31½ @.31¾
Amber No. 2	.13¾ @.14	.32¼ @.33½	.31¼ @.31½
Amber No. 3	.13½ @	.32 @	.31 @.31¼
Brown, clean, thick, thin	.13½ @	.32 @.32¼	.31¼ @.31½
Brown, specky	.12 @.13	.31½ @	.30½ @
Brown, rolled	.12½ @	.30½ @	.29 @

Crude Rubber Market—*Continued*

SHEET			
Smoked, ribbed	.14½@	.33½@.33¾	.31¾@.32
Smoked, plain	.14 @	.33 @	.31¼@
Unsmoked	.14 @	.32 @	.30¾@
SCRAP			
Colombo scrap No. 1	.12 @.12½	@	@
Colombo scrap No. 2	.10¾@.11	@	@
East Indian	March 27, 1922	March 26, 1923	April 25, 1923
PONTIANAK			
Banjermassin	.08 @	.08 @	.08 @
Palembang	.10 @	@	@
Pressed block	.13 @	.14 @	.13½@
Sarawak	.06¾@	.07½@	.09½@
South American			
PARAS			
Upriver fine	.17½@.17¾	.30½@	.28½@.28¾
Upriver fine*	@	*.43 @	*.40 @
Upriver, medium	.16 @.17	.28½@	.26¾@.27
Upriver, coarse	.13 @	.27½@	.25½@.26
Upriver, coarse*	@	@	*.37 @
Upriver, weak, fine	.15 @.16	@	.27 @
Islands fine	.16¾@.17	.29 @	.27½@
Islands medium	.15 @.15½	.25 @	.26¼@
Islands coarse	.08 @.08½	.15 @	.14¾@
Cametá	.09½@	.15 @	.15½@
Acre Bolivian fine	.18 @	.30½@	.28½@.29
Acre Bolivian fine*	@	*.43 @	*.40½@
Beni Bolivian	.18½@.19	.30½@	.29 @
Madeira fine	.19 @.20	.31 @	.28½@.29
Peruvian fine	.16½@.16¾	.29 @	.27¼@
Tapajos fine	.16 @.16¾	.29 @	.27¼@
CAUCHO			
Upper caucho ball	.13 @	.28 @	.27½@
Upper caucho ball*	@	*.40 @	*.37½@
Lower caucho ball	.11½@	.27 @	.26½@
Maniçobas			
Ceará negro heads	†.11 @	.24 @	.23 @
Ceará scrap	†.07 @	.13 @	.09 @
Maniçoba, 30% guaranty	†.08½@	.26 @	.20 @
Mangabeira, thin sheet	†.14 @	.30 @	.26 @
Centrals			
Central scrap	.09 @.10½	.25 @.26	.23½@.24
Central scrap and strip	.08 @.09	.24 @.25	.23 @.23½
Central wet sheet	.04 @.06	.18 @.20	.14 @.16
Corinto scrap	.09 @.10½	.25 @.26	.23¾@.24½
Esmeralda sausage	.09 @.10½	.25 @.26	.23¾@.24¼
Guayule washed and dried	.26 @	.29 @	.28 @
Africans			
Benguela, No. 1, 28½%	.09 @	.20 @	.18 @
Benguela, No. 2, 32½%	.07 @	.17 @	.15 @
Congo prime, black upper	.14½@	.25 @	.28 @
Congo prime, red upper	.14 @	.26 @	.27 @
Kassai, black	.14 @	.26 @	.28 @
red	.10 @.12	.27 @	.27 @
Gutta Percha			
Gutta Siak	.17¾@.18	.20 @	.19¼@
Red Macassar	3.00 @	3.10 @	3.00 @
Balata			
Block, Ciudad Bolivar	.51 @	.75 @	.73 @
Colombia	.46 @	.66 @	.61 @
Panama	.45 @	.64 @	.60 @
Surinam, sheet	.67 @	.85 @	.83 @
amber	.72 @	.92 @	.88 @
Chicle			
Colombia	@	.25 @.30	.25 @.30
Honduras	@	.62 @	.62 @
Venezuela	@	.63 @	.63 @
Yucatan fine	@	.65 @	.65 @

*Washed and dried crêpe. Shipment from Brazil.
†Nominal.

Comparative Low and High New York Spot Rubber Prices

	April 1923*	April 1922	April 1921
PLANTATIONS			
First latex crêpe	$0.31¼@$0.34½	$0.14¾@$0.16¼	$0.18¼@$0.19½
Smoked sheet, ribbed	.31¼@.34½	.14¾@.16¾	.16 @.17¼
PARAS			
Upriver, fine	.28½@.30¾	.17¼@.19¼	.16½@.18
Upriver, coarse	.26½@.28½	.12 @.14	.09 @.10½
Islands, fine	.26¼@.29	.16 @.18¼	.17 @.18
Islands, coarse	.15 @.22	.07½@.09¾	.09½@.12
Cametá	.15 @.17	.09 @.10	.08 @.11

*Figured to April 25, 1923.

Amsterdam Rubber Market

JOOSTEN & JANSSEN, Amsterdam, report under date of April 13, 1923:

The week opened with a revival of business and advancing prices.

After 93 cents had been touched for spot and 99 October to December the market took a downward tendency, prices gave way rather quickly and all interest disappeared.

The close is about 4 cents below the top, as follows:

Hevea crêpe Fl.	$0.90	Sheets Fl. $0.91	Spot.
Hevea crêpe Fl.	.93	Sheets Fl. .93½	July to September
Hevea crêpe Fl.	.95	Sheets Fl. .95½	October to December.

Reclaimed Rubber

Present quotations on reclaims are essentially unchanged from those of last month except minor fractional reductions in a few instances, namely, pure gum friction, compounded tubes, and unwashed shoe stock. The demand for reclaims is good, many plants operating to capacity. At present prices profit is only possible on that basis. Better value in reclaims has seldom been available at such basic prices.

Sales center largely around the better grades of friction, tube and shoe stocks with some interest in solid tire reclaim.

A comprehensive classification of grades follows, with revised quotations:

New York Quotations

April 26, 1923

Prices subject to change without notice

Reclaimed Stocks

	Per Pound
FRICTION	
Compounded, lb.	$0.18 @$0.19
Pure gum friction, lb.	.23 @ .25
TUBE	
Compounded, lb.	.13 @ .13½
Floating, lb.	.16 @ .16½
AUTO TIRE	
Black, lb.	.09¾@ .10
Gray, lb.	.11½@ .11¾
White, lb.	.13½@ .14
Black, washed, lb.	.11 @ .11¼
SHOE	
Unwashed, lb.	.11¼@ .11¾
Washed, lb.	.13¾@ .14
MECHANICAL, lb.	.10 @ .11
TRUCK TIRE, lb.	.09 @ .09½

New York Average Spot Rubber Prices

PRICES IN CENTS PER POUND

PLANTATIONS	March, 1923 19	20	21	22	23	24	26	27	28	29	30*	31*	April, 1923 2	3	4	5	6	7	10	11	12	13	14
Sheet																							
Ribbed smoked	33¾	33¾	33⅝	33⅝	33⅜	33½	33⅝	34	33⅞	33⅜	....	....	33¾	33½	33⅝	33⅝	33⅞	34¼	33½	33⅜	32⅞	32⅞	32⅞
Crêpe																							
First latex	33¾	33⅞	33⅝	33⅝	33⅜	33½	33⅝	34⅛	33⅞	33⅜	....	....	33⅜	33½	33⅝	33⅝	33⅞	34¼	33½	33⅜	33	32⅞	32⅞
Off latex	33⅛	33⅛	33⅛	33	32⅞	33⅛	33¼	33½	33⅜	33	....	....	33	33⅛	33⅛	33½	33¼	33¾	33	33⅛	32⅝	32½	32⅝
No. 1 blanket	33⅛	33¼	32⅞	33	32¾	32⅜	33	33⅛	33¼	32½	....	....	32¾	32¾	33	33⅛	33¼	33½	33	32⅞	32⅜	32⅜	32¼
No. 2 blanket	32¾	32¾	32½	32½	32¼	32⅛	32½	32⅝	32⅝	32¼	....	....	32⅝	32¼	32½	32⅝	32¾	33	32½	32¼	32	31⅞	31¾
No. 3 blanket	32¼	32¼	32	32	31¾	31¾	31⅞	32¼	32⅛	31⅞	....	....	31¾	31⅞	32	32⅛	32¼	32½	32⅛	31¾	31½	31¾	31½
Thin, clean, brown	32⅝	32⅝	32⅝	32¼	32¼	32¼	32⅜	32⅞	32⅝	32	....	....	32⅛	32⅛	32¼	32⅜	32⅜	32⅝	32⅜	32	31¾	31½	31⅜
Specky brown	31⅞	31⅝	31⅞	31⅜	31¼	32⅛	31½	31⅝	31¾	31¼	....	....	31⅛	31⅜	31⅜	31⅝	31½	31⅞	31½	31¼	31	31	30⅞
Rolled brown	30⅛	30	29¾	29¾	29½	29½	30	30	29⅞	29⅜	....	....	29⅜	29⅜	29½	29⅜	30	30¼	30	29¾	29⅜	29¼	29¼

* No market.

Crude Rubber Arrivals at New York as Stated by Ships' Manifests

Parás and Caucho

	Fine	Medium	Coarse	Caucho	Totals Pounds
MARCH 26. By "Cuthbert," Pará and Manáos.					
Poel & Kelly, Inc.	71,898	10,942	4,115	101,606	188,561
Ultramares Corporation	22,270	.....	.....	.....	22,270
Paul Bertuch	11,200	5,000	52,496	65,954	134,650
General Rubber Co.	79,520	.....	10,080	.....	47,040
MARCH 28. By "Iquassu," Pará.					
Paul Bertuch	8,174	.....	.....	.....	8,174
MARCH 30. By "Sixaola," Puerto Colombia.					
Ultramares Corporation	.....	.....	.....	5,170	5,170
MARCH 31. By "Linnell," Pará.					
General Rubber Co.	123,200	.....	14,560	.....	137,760
H. O. Astlett & Co.	51,170	5,900	1,040	7,190	65,300
APRIL 1. By "Cavour," Pará.					
General Rubber Co.	.....	.....	.....	.....	¶96,320
H. A. Astlett & Co.	**3,080	13,830	36,370	8,500	61,780
APRIL 3. By "Dunstan," Manáos, Pará and Iquitos.					
Paul Bertuch	12,440	.....	8,960	.....	21,400
Ultramares Corporation	4,330	.....	350	5,420	10,100
Poel & Kelly, Inc.	.....	.....	.....	82,562	82,562
Meyer & Brown, Inc.	.....	.....	20,000	5,600	25,600
F. R. Henderson & Co., Inc.	25,600	3,400	9,800	5,008	43,808
H. A. Astlett & Co., Inc.	8,100	.....	.....	.....	8,100
APRIL 6. By "Pocone," Pará.					
H. A. Astlett & Co.	4,330	4,570	5,450	27,720	42,070
H. A. Astlett & Co.	.....	.....	**12,470	.....	**12,470
APRIL 17. By "Sallust," Pará.					
F. R. Henderson & Co., Inc.	.....	9,000	27,890	160,081	196,971
H. A. Astlett & Co.	23,190	.....	13,730	.....	36,920

¶Cametá. **Washed and dried in Brazil.

Plantations

(Figured at 180 lbs. net to the bale or case.)

	Pounds	Totals
MARCH 19. By "Carmania," Liverpool.		
Various	16,560	16,560
MARCH 19. By "City of Shanghai," Far East.		
General Rubber Co.	89,600	
L. Littlejohn & Co., Inc.	616,000	
Charles T. Wilson Co., Inc.	320,320	
Charles T. Wilson Co., Inc.	*22,400	
Various	438,200	1,486,520
MARCH 25. By "Menominee," London.		
General Rubber Co.	411,040	
L. Littlejohn & Co., Inc.	159,348	
Various	355,172	925,560
MARCH 25. By "Irishman," Far East.		
General Rubber Co.	495,040	
L. Littlejohn & Co., Inc.	44,800	
Various	320,200	860,040
L. Littlejohn & Co., Inc.	8,960	8,960
MARCH 26. By "Virgilia," London.		
Fisk Rubber Co.	224,000	
General Rubber Co.	788,480	
L. Littlejohn & Co., Inc.	494,980	
Poel & Kelly, Inc.	166,774	1,674,234
MARCH 27. By "Majestic," Southampton.		
Various	65,520	65,520
MARCH 27. By "Cristobal," Cristobal.		
Various	6,848	6,848
MARCH 27. By "Margaret Dollar," Far East.		
H. A. Astlett & Co.	44,800	
Baird Rubber & Trading Co., Inc.	134,400	
General Rubber Co.	500,740	
Hood Rubber Co.	11,128	
L. Littlejohn & Co., Inc.	996,800	
L. Littlejohn & Co., Inc.	*33,600	
H. Muehlstein & Co., Inc.	89,600	
Poel & Kelly, Inc.	1,615,735	
Fred Stern & Co., Inc.	239,693	
William H. Stiles & Co.	145,600	
F. R. Henderson & Co., Inc.	280,050	
Various	*29,400	
Various	†135,000	
Various	576,454	4,833,000
MARCH 28. By "President Lincoln," Far East.		
Poel & Kelly, Inc.	‖89,600	89,600
MARCH 28. By "City of Adelaide," Far East.		
Fisk Rubber Co.	11,200	
General Rubber Co.	259,840	
L. Littlejohn & Co., Inc.	526,400	
Fred Stern & Co., Inc.	179,200	
Charles T. Wilson Co., Inc.	302,400	
F. R. Henderson & Co., Inc.	145,800	
Meyer & Brown, Inc.	224,000	
Various	346,000	1,994,840
MARCH 28. By "London Exchange," London.		
L. Littlejohn & Co., Inc.	297,578	
Various	65,662	363,240
MARCH 28. By "Pres. Van Buren," London.		
Various	75,060	75,060
MARCH 28. By "Swazi," Far East.		
H. A. Astlett & Co.	492,800	
Baird Rubber & Trading Co., Inc.	291,200	
General Rubber Co.	168,000	
Hood Rubber Co.	85,420	
J. T. Johnstone & Co., Inc.	277,157	
L. Littlejohn & Co., Inc.	1,512,000	
Meyer & Brown, Inc.	431,200	
Fred Stern & Co., Inc.	134,359	
William H. Stiles & Co.	11,200	
Charles T. Wilson Co., Inc.	286,720	
F. R. Henderson & Co., Inc.	44,800	
Various	*144,180	
Various	2,144,304	6,023,340
MARCH 28. By "Stuart Dollar," Far East.		
Fred Stern & Co., Inc.	‡156,800	
Charles T. Wilson Co., Inc.	‡215,040	371,840
MARCH 29. By "Clan Buchanan," Far East.		
General Rubber Co.	22,400	
L. Littlejohn & Co., Inc.	134,400	
Meyer & Brown, Inc.	11,200	
Charles T. Wilson Co., Inc.	5,600	173,600
MARCH 30. By "Gaasterdyk," Rotterdam.		
H. A. Astlett & Co.	44,800	
L. Littlejohn & Co., Inc.	112,000	
Poel & Kelly, Inc.	11,145	
Various	73,255	241,200
MARCH 31. By "Durban Maru," Singapore.		
Various	214,200	214,200
MARCH 31. By "Union City," Liverpool.		
Various	87,300	87,300
MARCH 31. By "Vennonia," Far East.		
Fisk Rubber Co.	224,000	
General Rubber Co.	696,640	
Charles T. Wilson Co., Inc.	8,960	
Poel & Kelly, Inc.	667,422	
L. Littlejohn & Co., Inc.	287,822	1,884,844
MARCH 31. By "Gothic Prince," Far East.		
H. A. Astlett & Co.	78,400	
Baird Rubber & Trading Co., Inc.	145,600	
Fisk Rubber Co.	56,000	
General Rubber Co.	22,400	
F. R. Henderson & Co., Inc.	243,358	
Hood Rubber Co.	*224,125	
L. Littlejohn & Co., Inc.	638,400	
Meyer & Brown, Inc.	604,800	
H. Muehlstein & Co., Inc.	78,400	
Poel & Kelly, Inc.	551,623	
Fred Stern & Co., Inc.	351,918	
William H. Stiles & Co.	67,200	
Charles T. Wilson Co., Inc.	44,800	
Various	*330,995	
Various	2,119,661	5,557,680
APRIL 1. By "Gen. Goethals," Cristobal.		
Various	40,140	40,140
APRIL 1. By "Ala," Rotterdam.		
William H. Stiles & Co.	69,440	
Various	18,940	88,380
APRIL 2. By "Karimata," Far East.		
Fisk Rubber Co.	67,200	
General Rubber Co.	145,600	
L. Littlejohn & Co., Inc.	439,040	
Meyer & Brown, Inc.	89,600	
H. Muehlstein & Co., Inc.	313,600	
Poel & Kelly, Inc.	185,576	
Various	*87,670	1,328,286
APRIL 2. By "Maine," London.		
General Rubber Co.	707,840	
Various	218,980	926,820
APRIL 3. By "Finland," Antwerp.		
J. T. Johnstone & Co., Inc.	24,277	
Various	91,103	115,380
APRIL 3. By "Baltic," Liverpool.		
Various	405,280	405,280
APRIL 3. By "Cedric," Far East.		
General Rubber Co.	250,880	
L. Littlejohn & Co., Inc.	23,520	274,400
APRIL 6. By "Alaska Maru," Far East.		
Baird Rubber & Trading Co., Inc.	56,000	
F. R. Henderson & Co., Inc.	203,850	
L. Littlejohn & Co., Inc.	1,260,080	
Meyer & Brown, Inc.	44,800	
Poel & Kelly, Inc.	192,078	1,712,008
APRIL 6. By "City of Dunkirk," Far East.		
H. A. Astlett & Co.	533,120	
Baird Rubber & Trading Co., Inc.	392,000	
General Rubber Co.	145,600	
F. R. Henderson & Co., Inc.	42,560	
J. T. Johnstone & Co., Inc.	221,760	
L. Littlejohn & Co., Inc.	1,720,320	
Meyer & Brown, Inc.	392,000	
H. Muehlstein & Co., Inc.	212,800	
Poel & Kelly, Inc.	*426,200	
Fred Stern & Co., Inc.	183,680	
William H. Stiles & Co.	176,960	
Charles T. Wilson Co., Inc.	107,520	
Charles T. Wilson Co., Inc.	*44,800	
Various	2,529,880	7,129,200
APRIL 7. By "Volendam," Rotterdam.		
L. Littlejohn & Co., Inc.	100,800	
Various	42,660	143,460
APRIL 7. By "Missouri," London.		
General Rubber Co.	741,440	
L. Littlejohn & Co., Inc.	112,000	
Various	361,920	1,215,360
APRIL 7. By "West Ivan," Singapore.		
Fred Stern & Co., Inc.	‡89,600	89,600
APRIL 8. By "Verbania," London.		
Fisk Rubber Co.	112,000	
General Rubber Co.	488,320	
Poel & Kelly, Inc.	45,110	
Various	145,670	771,100
APRIL 9. By "Scythian," London.		
Hood Rubber Co.	*2,240	
Various	23,860	26,100
APRIL 9. By "Ceylon Maru," Far East.		
F. R. Henderson & Co., Inc.	56,000	
Meyer & Brown, Inc.	112,000	
L. Littlejohn & Co., Inc.	246,400	
Fisk Rubber Co.	112,000	
Poel & Kelly, Inc.	22,400	
Various	93,620	642,420
APRIL 9. By "Bearport," Far East.		
Poel & Kelly, Inc.	‡56,000	
Fred Stern & Co., Inc.	‡44,800	
F. R. Henderson & Co., Inc.	‡145,000	245,800
APRIL 10. By "Andania," Liverpool.		
Various	96,300	96,300
APRIL 11. By "Mesaba," London.		
Fisk Rubber Co.	448,000	
General Rubber Co.	772,800	
Fred Stern & Co., Inc.	111,845	
Various	50,755	1,383,400
APRIL 11. By "Mount Clay," Hamburg.		
L. Littlejohn & Co., Inc.	22,400	22,400
APRIL 11. By "President Garfield," London.		
Various	3,780	3,780
APRIL 13. By "Ningchow," Far East.		
H. A. Astlett & Co.	470,400	
Baird Rubber & Trading Co., Inc.	369,600	
Fisk Rubber Co.	185,920	
General Rubber Co.	76,440	
F. R. Henderson & Co., Inc.	63,706	
Hood Rubber Co.	*145,590	
J. T. Johnstone & Co., Inc.	278,432	
L. Littlejohn & Co., Inc.	2,840,000	
H. Muehlstein & Co.	80,640	
Poel & Kelly, Inc.	398,720	
Fred Stern & Co., Inc.	199,412	
William H. Stiles & Co.	44,800	
Charles T. Wilson Co., Inc.	624,960	
Charles T. Wilson Co., Inc.	*22,400	
Various	*19,750	
Various	3,147,030	8,967,780

*Arrived at Boston.
†Arrived at Baltimore.
‡Arrived at San Francisco.
‖Arrived at Denver.
MARCH 25. By "Emden," Hamburg.

Crude Rubber Arrivals at New York as Stated by Ships' Manifests—*Continued*

	Pounds	Totals
APRIL 13. By "Vardulia," Far East.		
General Rubber Co.	443,520	
F. R. Henderson & Co., Inc.	26,350	
William H. Stiles & Co.	190,400	
Poel & Kelly, Inc.	449,166	
Various	1,213,284	2,322,720
APRIL 13. By "Naneric," Far East.		
Charles T. Wilson Co., Inc.	71,680	
Meyer & Brown, Inc.	56,000	
Poel & Kelly, Inc.	67,200	
H. A. Astlett & Co.	257,600	
L. Littlejohn & Co., Inc.	416,640	
Various	249,400	1,118,520
APRIL 15. By "Bowes Castle," Far East.		
H. A. Astlett & Co.	67,200	
Baird Rubber & Trading Co., Inc.	11,200	
Hood Rubber Co.	*336,180	
F. R. Henderson & Co., Inc.	67,200	
L. Littlejohn & Co., Inc.	1,415,680	
Poel & Kelly, Inc.	583,211	
Fred Stern & Co., Inc.	117,600	
Various	*164,940	
Various	3,928,549	6,691,760
APRIL 15. By "Laertes," Far East.		
H. A. Astlett & Co.	44,800	
L. Littlejohn & Co., Inc.	504,000	
Poel & Kelly, Inc.	20,675	
Various	*43,200	
Various	935,325	1,548,000
APRIL 15. By "Calamares," Cristobal.		
Various	5,940	5,940
APRIL 16. By "Antonia," London.		
Various	808,920	808,920
APRIL 16. By "Woyo Maru," Far East.		
L. Littlejohn & Co., Inc.	58,240	
Poel & Kelly, Inc.	56,803	
Various	255,217	370,260
APRIL 17. By "Grotendyk," Rotterdam.		
L. Littlejohn & Co., Inc.	660,490	660,490

Rubber Latex

	Pounds	Totals
MARCH 27. By "Margaret Dollar," Belawan-Deli.		
Various		180 tons
MARCH 28. By "Swazi," Singapore.		
H. A. Astlett & Co.		500 gal.
APRIL 2. By "Karimata," Belawan-Deli.		
E. Naumburg & Co.		810 gal.
APRIL 15. By "Bowes Castle," Belawan-Deli.		
Various		50 tons.

Africans

MARCH 18. By "Meltonia," Antwerp.		
Hood Rubber Co.	*37,988	37,988
MARCH 21. By "Mongolia," Hamburg.		
Poel & Kelly, Inc.	159,709	159,709
MARCH 25. By "Sarcoxie," Bordeaux.		
Poel & Kelly, Inc.	21,976	21,976
MARCH 31. By "Port Hacking," Liverpool.		
Poel & Kelly, Inc.	5,565	5,565
APRIL 10. By "Orduna," Hamburg.		
Poel & Kelly, Inc.	96,300	96,300

Centrals

MARCH 29. By "Sixaola," Cristobal.		
Various	6,660	6,660
MARCH 29. By "Venezuela," Corinto.		
Ultramares Corporation	898	898
APRIL 19. By "Ecuador," Corinto.		
Ultramares Corporation	1,714	1,714

Manicobas

MARCH 27. By "Iquassu," Bahia.		
Adolph Hirsch & Co., Inc.	24,600	24,600

Gutta Siak

MARCH 31. By "Gothic Prince," Singapore.		
L. Littlejohn & Co., Inc.	123,200	123,200
APRIL 16. By "Bowes Castle," Singapore.		
L. Littlejohn & Co., Inc.	33,600	33,600

Pontianak

	Pounds	Totals
MARCH 18. By "Mobile City," Singapore.		
F. R. Henderson & Co., Inc.	140,900	
Various	142,000	282,900
MARCH 27. By "Margaret Dollar," Singapore.		
F. R. Henderson & Co., Inc.	168,000	168,000
MARCH 28. By "Swazi," Singapore.		
Various	10,200	10,200
APRIL 2. By "Karimata," Java.		
L. Littlejohn & Co., Inc.	470,400	470,400
L. Littlejohn & Co., Inc.	39,000	
APRIL 6. By "City of Dunkirk," Singapore.		
F. R. Henderson & Co., Inc.	107,520	146,520
APRIL 15. By "Laertes," Java.		
L. Littlejohn & Co., Inc.	302,400	302,400
APRIL 16. By "Bowes Castle," Singapore.		
L. Littlejohn & Co., Inc.	67,200	67,200

Balata

MARCH 20. By "Nickerie," Port au Prince.		
Various	3,450	3,450
MARCH 21. By "Matura," Bolivar.		
Various	3,450	3,450
MARCH 25. "Menominee," London.		
Various	10,950	10,950
MARCH 26. By "Cuthbert," Manáos.		
L. Littlejohn & Co., Inc.	12,000	
Paul Bertuch	1,793	
General Rubber Co.	22,400	36,193
MARCH 27. By "Cristobal," Cristobal.		
Various	1,200	1,200
APRIL 1. By "Gen. Goethals," Cristobal.		
Various	40,140	40,140
APRIL 3. By "Dunstan," Pará.		
Various	8,550	8,550
APRIL 4. By "Mayaro," Trinidad.		
Middleton & Co., Ltd.	6,686	
Various	214	6,900
APRIL 5. By "Paria," Far East.		
Middleton & Co., Ltd.	13,200	
Various	1,451	14,651
APRIL 15. By "Maraval," Cristobal.		
Various	19,800	19,800
APRIL 16. By "Prins de Nederlander," Port au Prince.		
Various	18,300	18,300

United States Crude and Waste Rubber Imports for 1923 (By Months)

	Plantations	Parás	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Totals 1923	Totals 1922	Balata	Miscellaneous	Waste
January ....tons	29,354	1,233	549	61	.....	.....	31,197	21,867	64	257	382
February	21,815	2,004	308	93	.....	.....	24,220	28,973	25	397	684
March	31,673	1,482	742	19	.....	.....	33,916	28,702	124	738	863
Totals, 3 months, 1923....tons	82,842	4,719	1,599	173	.....	.....	89,333	.....	213	1,392	1,929
Totals, 3 months, 1922.....	75,755	2,714	788	33	154	98	.....	79,542	87	1,053	152

Compiled by the Rubber Association of America, Inc.

Plantation Rubber Exports from Dutch East Indies

Java and Madura

	January 1922	January 1923
To Netherlands and Netherlands f. o. ....kilos	180,000	250,000
Great Britain	337,000	478,000
Germany	23,000	26,000
France and France f. o.	.....	99,000
Italy	.....	14,000
United States	1,675,000	1,177,000
Singapore	203,000	127,000
Japan	23,000	9,000
Total ....kilos	2,449,000	2,180,000
Ports of Origin:		
Tandjong Priok ....kilos	1,314,000	1,081,000
Samarang	26,000	90,000
Soerabaya	1,035,000	776,000

Belawan-Deli

	January 1922	January 1923
Netherlands and Netherlands f. o. ....kilos	100,824	1,079,698
Great Britain	61,469	1,044,331
Germany	58,436	499,019
France	.....	498,319
Denmark	.....	304,842
United States	919,933	19
Penang	3,140	.....
Singapore	178,370	23,440
Total ....kilos	1,322,172	3,449,668

Plantation Rubber Exports from Malaya

	January 1 to January 31, 1923 Singapore Pounds	Malacca Pounds	Penang Pounds	January 1 to March 15, 1923 Port Swettenham Pounds	Totals Pounds
To United Kingdom,	793,500	541,800	685,800	1,766,114	3,787,214
The Continent ..	2,925,700	299,200	877,900	44,800	4,147,600
Japan	1,710,000	22,400	78,400	.....	1,810,800
United States....	27,863,000	2,824,000	5,778,600	685,826	35,151,426
British Possessions	427,600	.....	92,300	77,675	597,575
Other countries...	15,700	.....	.....	.....	15,700
Totals	33,735,500	3,687,400	5,513,000	2,574,415	45,510,315

Annual Exports, 1914-1922

Year					
1922 .....pounds.	359,211,200	52,246,700	51,914,900	24,914,960	488,287,760
1921	298,231,765	12,709,484	35,978,829	18,633,855	365,553,933
1920	374,718,987	4,508,453	45,022,557	26,306,225	450,556,222
1919	352,338,000	17,849,500	25,779,500	30,850,166	426,817,166
1918	225,100,000	837,600	12,479,200	.....	238,416,800
1917	177,901,200	15,113,200	23,402,000	.....	216,416,200
1916	135,535,954	7,167,346	30,643,565	3,660,840	177,007,705
1915	86,067,657	7,898,984	28,580,663	821,445	123,368,749
1914	43,534,177	5,218,379	21,912,567	2,052,620	72,717,743

Exports of India Rubber Manufactures from the United

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Thread Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Canvas Shoes with Rubber Soles Pairs	Canvas Shoes with Rubber Soles Value	Soles and Heels Value	Leather Cloth or Artificial Leather Value	Waterproofed and Auto Cloth and Auto Topping Value
EUROPE													
Austria	.....	.....	.....	.....	.....	.....	2,373	$3,106	.....	.....	.....	.....	.....
Azores and Madeira Islands	.....	$206	.....	.....	6	$20	.....	.....	.....	.....	.....	.....	.....
Belgium	$26,130	16,310	$8,672	$24,535	990	3,147	24,188	18,397	.....	.....	$119	$22,880	$17,087
Bulgaria	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	.....	.....
Czechoslovakia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,086	43
Denmark	2,264	2,696	6,061	.....	2,986	6,057	48,044	60,747	28,800	$23,763	1,920	21,250	13,343
Esthonia	.....	.....	.....	.....	.....	.....	15,440	11,680	.....	.....	.....	.....	.....
Finland	31,549	39	669	.....	.....	.....	.....	.....	.....	.....	16	2,320	131
France	46,212	6,702	4,407	338,339	58	120	3,912	3,263	4,015	3,602	332	441,246	5,463
Germany	2,209	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	620	277
Gibraltar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greece	.....	173	.....	.....	.....	.....	240	284	.....	.....	40	573	12
Hungary	1,380	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iceland and Faroe Islands	.....	182	.....	.....	12,545	37,120	9,981	20,927	.....	.....	327	73	64
Italy	360	2,230	300	44,619	3,618	6,904	9,157	6,532	568	559	1,346	41,812	46,220
Jugoslavia, Albania, etc	.....	.....	.....	.....	.....	.....	3,024	7,000	.....	.....	.....	.....	.....
Latvia	.....	247	.....	.....	24	88	25	20	.....	.....	.....	.....	.....
Lithuania	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malta, Gozo, etc	.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands	22,464	14,495	224	622	.....	.....	540	487	19,200	17,445	2,822	7,110	1,114
Norway	14,928	3,916	141	.....	3,082	9,023	98,239	70,660	44,218	28,991	3,050	34,344	6,104
Poland and Danzig	732	815	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,316
Portugal	50	1,784	.....	.....	1,770	7,500	.....	.....	504	408	368	2,754	821
Rumania	.....	4,789	2,317	.....	.....	.....	33,160	40,015	.....	.....	.....	3,276	34
Russia in Europe	.....	746	.....	.....	50	182	.....	.....	.....	.....	.....	.....	.....
Spain	3,787	66	125	17,744	488	1,557	13,845	9,505	60	67	4,697	77,334	3,215
Sweden	28,775	9,693	1,936	1,287	874	2,832	3,041	3,563	192	507	3,224	114,071	1,507
Switzerland	2,161	.....	.....	20,861	.....	.....	44,093	34,022	326	309	59	8,750	2,176
Turkey in Europe	.....	2,344	.....	.....	.....	.....	29,412	26,161	.....	.....	584	1,209	.....
Ukraine	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250
England	32,289	223,003	46,052	577,127	47,691	93,344	64,130	53,897	311,725	236,063	31,459	108,237	79,470
Scotland	7,521	1,435	3,981	.....	4,495	11,364	11,714	7,295	44,592	33,720	110	65,923	1,657
Ireland	.....	.....	.....	.....	13	32	853	191	.....	.....	.....	.....	21
TOTALS, EUROPE	$225,811	$291,913	$74,909	$1,025,134	78,691	$179,230	415,411	$377,752	454,200	$345,434	$50,538	$955,868	$189,325
NORTH AMERICA													
Canada—Maritime Provinces	$9,001	$4,752	$490	$52	9,437	$30,803	2,239	$1,551	2,288	$2,194	$1,312	$2,518	$1,105
Quebec and Ontario	86,079	111,071	52,922	39,568	3,290	10,749	6,892	11,370	30,191	30,564	10,187	256,611	229,820
Prairie Provinces	2,570	7,663	1,509	229	84	289	1,136	1,904	1,910	2,330	27	7,049	3,693
Brit. Col. and Y'k'n	25,022	10,430	4,355	39	7,680	30,643	4,921	7,513	269	289	1,633	4,300	3,872
British Honduras	393	956	147	.....	40	135	3,528	3,677	13,173	13,342	737	26	18
Costa Rica	1,928	8,129	520	.....	.....	.....	379	299	769	970	11,465	1,264	981
Guatemala	2,971	3,719	991	61	2	13	1,626	1,476	8,060	6,874	8,464	1,916	803
Honduras	1,607	13,114	2,825	23	80	260	1,582	1,434	10,968	12,020	6,389	1,214	460
Nicaragua	5,217	1,388	2,187	.....	.....	.....	150	131	5,334	5,507	8,960	92	1,076
Panama	3,064	12,516	1,958	.....	36	120	7,151	8,496	45,161	35,780	12,215	2,948	1,461
Salvador	1,536	1,894	1,436	1,598	.....	.....	302	270	8,243	2,795	32,149	985	548
Mexico	178,622	234,443	95,449	1,030	2,341	4,958	75,843	50,492	299,143	272,423	195,535	40,612	18,856
Miquelon and St. Pierre Isls.	20	.....	25	.....	6,847	19,196	252	222	.....	.....	.....	.....	.....
Newfoundland and Labrador	6,560	3,550	1,650	.....	34,340	92,442	35,069	26,154	13,679	10,889	6,412	483	965
Bermuda	473	3,129	257	.....	212	438	585	512	8,428	10,847	2,308	352	780
Barbados	150	180	297	.....	.....	.....	208	226	3,742	3,521	43	146	1,502
Jamaica	260	4,577	1,514	.....	.....	.....	468	505	49,434	45,236	6,410	3,313	6,968
Trinidad and Tobago	1,623	4,012	4,284	.....	.....	.....	1,989	1,828	18,980	15,747	824	1,308	6,017
Other British West Indies	3,812	7,018	657	.....	.....	.....	2,620	2,348	27,762	26,842	1,028	213	511
Cuba	21,132	79,461	56,409	229	291	913	10,301	8,206	616,361	408,572	100,127	48,391	52,164
Dominican Republic	2,453	6,329	4,645	.....	5	14	4,044	3,413	17,387	16,820	4,958	3,477	2,703
Dutch West Indies	240	2,005	302	.....	.....	.....	515	448	36,591	28,045	1,598	173	318
French West Indies	1,276	159	75	.....	2	7	.....	.....	458	401	12	66	1,756
Haiti	902	664	1,272	.....	1	3	48	39	1,537	1,973	983	1,042	2,207
Virgin Islands of U. States	28	712	425	.....	.....	.....	228	273	7,439	8,590	1,066	13	250
TOTALS, NORTH AMERICA	$356,939	$521,871	$236,601	$42,829	64,688	$190,983	162,076	$132,787	1,222,307	$962,571	$414,842	$378,511	$338,834
SOUTH AMERICA													
Argentina	$45,154	$42,252	$9,428	$102	923	$2,684	19,285	$15,157	463,432	$369,526	$45,884	$55,909	$113,021
Bolivia	7,339	1,293	135	.....	100	25	.....	.....	132	140	724	302	1,842
Brazil	81,545	50,156	13,380	3,986	514	2,985	3,568	1,994	733	1,125	8,799	16,779	30,652
Chile	61,094	81,606	6,141	.....	4,398	13,800	3,298	2,607	2,166	2,037	1,604	26,646	7,916
Colombia	9,767	15,453	4,770	180	18	50	3,559	3,032	26,099	21,313	39,953	12,260	5,742
Ecuador	393	5,699	997	.....	12	26	354	257	31,208	21,719	2,779	1,921	1,250
British Guiana	546	320	628	.....	.....	.....	528	513	23,623	21,797	.....	225	1,351
Dutch Guiana	253	216	84	.....	.....	.....	96	60	1,806	1,743	198	227	101
French Guiana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....
Paraguay	2,656	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	176
Peru	12,414	17,710	9,179	110	1,170	5,707	123	283	2,031	2,239	1,703	5,992	3,430
Uruguay	2,119	2,412	994	.....	119	476	3,362	2,696	36,879	27,698	12,539	5,798	14,380
Venezuela	2,890	9,530	11,893	339	42	132	1,674	1,305	.....	.....	13,367	12,763	2,762
TOTALS, SOUTH AMERICA	$226,170	$226,647	$57,629	$4,717	7,296	$25,885	35,847	$27,904	588,109	$469,337	$127,554	$138,822	$182,623
AFRICA													
Belgian Kongo	$98	.....	$28	.....	1	$7	.....	.....	.....	.....	.....	.....	$24
British West Africa	56	$300	.....	.....	5	19	.....	.....	196	$255	$54	$627	368
British South Africa	261,708	168,041	26,581	$469	3,655	9,502	8,209	$6,055	20,142	19,390	16,564	40,024	17,009
British East Africa	1,611	107	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,378	1,590
Canary Islands	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	643	898	82
Egypt	37	1,646	83	.....	.....	.....	.....	.....	.....	.....	173	12,152	665
Algeria and Tunis	8,241	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other French Africa	.....	.....	.....	.....	.....	.....	.....	.....	18	31	.....	.....	.....
Liberia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morocco	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	234
Portuguese East Africa	10,145	6,349	4,186	.....	.....	.....	.....	.....	.....	.....	.....	235	.....
Other Portuguese Africa	.....	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spanish Africa	.....	.....	89	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,916
TOTALS, AFRICA	$281,896	$176,457	$30,967	$469	3,661	$9,528	8,209	$6,055	20,356	$19,676	$17,434	$55,314	$21,884

States by Countries During the Calendar Year 1922

Waterproofed Clothing Value	Pneumatic Casings: Automobile Number	Pneumatic Casings: Automobile Value	Pneumatic Casings: Others Value	Solid Tires: Automobile Value	Solid Tires: Others Value	Pneumatic Tubes: Automobile Number	Pneumatic Tubes: Automobile Value	Pneumatic Tubes: Others Value	Tire Repair Materials Value	Druggists' Rubber Sundries Value	Hard Rubber Goods: Battery Jars and Accessories Value	Hard Rubber Goods: Other Electrical Supplies Value	Hard Rubber Goods: Others Value	All Other Rubber Manufactures Value	Totals Value
.....	158	$2,653	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	69	1,234	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$1,300	8,215	117,071	$3,960	.....	.....	48	$110	.....	.....	.....	.....	.....	.....	.....	$5,759
.....	45	514	.....	.....	$575	4,360	8,603	$291	$2,723	$19,099	.....	.....	.....	$45	1,615
.....	647	12,528	.....	.....	.....	138	325	.....	.....	.....	.....	$29	$181	20,650	311,759
1,841	32,986	483,973	8,712	$24,309	.....	260	636	.....	.....	.....	.....	.....	.....	.....	864
.....	212	4,249	.....	974	.....	21,981	44,807	1,720	8,611	18,395	.....	52	450	13,567	15,293
.....	2 154	35,929	491	1,321	.....	289	669	.....	.....	1,104	.....	.....	.....	260	744,538
2,162	24,373	275,251	1,642	3,744	92	1,314	4,428	75	990	.....	.....	.....	.....	1,982	18,936
.....	550	10,761	1,849	256	.....	4,169	10,951	80	8,284	37,334	$10,158	6.031	47,451	68,251	79,940
.....	1,110	11,430	.....	60	.....	801	1,796	254	340	1,059	.....	.....	.....	16	1,324,117
.....	8,529	120,089	242	2,980	1,331	372	796	.....	98	.....	.....	.....	.....	.....	19,453
.....	.....	.....	.....	.....	.....	6,664	12,421	27	950	87	.....	.....	.....	.....	12,384
122	813	12,204	.....	268	.....	.....	.....	.....	.....	.....	.....	.....	.....	812	140,021
2,359	6,260	95,670	18,698	93	.....	667	1,410	.....	128	.....	.....	.....	.....	463	1,843
.....	2,285	40,344	.....	.....	.....	4,571	11,366	2,524	1,144	3,625	.....	.....	90	.....	72,915
.....	19	257	73	.....	.....	3,891	9,072	.....	430	150	.....	.....	.....	21,209	307,570
.....	225	2,524	.....	.....	.....	12	23	12	132	1,676	.....	.....	.....	22	57,018
.....	1,694	19,062	.....	.....	.....	363	527	.....	.....	.....	.....	.....	.....	.....	2,528
1,252	12,223	193,125	11,417	5,566	800	859	1,548	16	183	.....	.....	75	.....	.....	3,051
3,611	21,353	404,717	5,791	20,552	185	7,499	15,812	2,315	1,485	8,688	23	24	89	295	22,569
.....	4,443	89,004	.....	36,738	.....	16,210	36,228	1,666	4,037	2,536	105	.....	197	22,974	335,343
53	5,748	87,316	2,407	5,439	.....	7,660	39,647	.....	7	.....	.....	.....	.....	10,434	665,428
64	1,114	22,688	15	.....	.....	2,996	6,779	791	326	651	.....	106	.....	.....	166,967
.....	775	14,273	.....	.....	.....	1,126	3,716	.....	666	142	.....	.....	.....	4,882	122,435
280	23,058	351,925	1,037	65,563	98	949	1,277	.....	.....	.....	.....	.....	.....	277	77,999
74	46,862	801,105	12,960	19,945	.....	15,099	30,002	389	10,659	3,182	612	6	268	22,816	604,934
46	1,774	26,742	2,216	64	.....	31,051	74,346	2,689	8,904	6,564	469	.....	8	14,889	1,109,348
.....	3,313	40,253	6	1,596	.....	1,066	1,999	274	.....	1,075	.....	.....	.....	10,853	111,607
.....	156	2,203	.....	.....	.....	2,551	5,929	.....	212	.....	.....	.....	.....	4	78,298
11,460	334,043	3,301,073	41,314	188,146	1,436	.....	.....	.....	.....	.....	.....	.....	.....	1,920	4,373
9,356	1,519	20,239	3,649	206	.....	167,819	246,222	5,580	44,248	343,127	13,107	8,900	142,851	550,079	6,378,524
.....	5,300	55,192	1,327	.....	758	715	1,333	441	1,228	12,816	.....	.....	2,289	11,464	195,967
						4,926	7,713	357	.....	360	.....	.....	5,030	2,123	73,104
$33,980	552,125	$6,655,598	$117,806	$378,070	$5,275	310,426	$580,491	$19,501	$95,785	$461,670	$24,474	$15,223	$198,904	$780,822	$13,083,513
$3,305	958	$14,109	$282	$39	$108	709	$1,356	$48	$1,094	$2,514	$5,816	$190	$1,444	$23,529	$107,612
31,651	54,384	753,470	3,258	125,026	7,956	59,087	115,878	1,353	38,730	138,857	77,549	27,469	114,099	815,288	3,089,525
6,991	2,857	31,338	151	4,297	112	3,198	5,111	145	3,460	22,201	10,177	1,090	11,358	51,234	174,928
4,916	1,685	27,648	484	9,074	283	975	2,063	45	699	6,209	308	628	4,043	30,254	174,750
238	246	2,295	41	.....	31	247	489	65	71	307	.....	17	44	471	23,500
2,036	993	19,400	186	478	722	652	1,917	6	189	759	58	333	93	1,470	53,203
372	1,896	47,792	210	1,169	3,779	1,246	3,258	42	1,106	806	74	46	288	1,332	87,562
5,127	885	18,308	243	9,354	144	552	1,725	90	14	1,365	.....	60	421	2,228	78,425
792	320	6,157	87	61	382	542	1,095	2	5	809	.....	81	5	1,263	35,297
2,330	8,982	108,855	2,087	11,321	1,836	8,637	14,064	832	1,720	3,554	1,299	73	946	11,987	239,462
119	1,533	29,076	49	3,545	111	1,571	3,587	11	414	459	.....	.....	63	798	81,443
73,685	79,747	1,014,935	19,829	78,839	13,956	78,696	167,733	2,384	13,832	26,831	1,015	10,220	16,021	148,942	2,680,642
3,004	.....	.....	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	22,561
30,717	1,202	18,298	658	186	103	1,181	2,170	3	150	1,067	.....	786	391	11,356	214,990
1,869	.....	.....	78	206	2,080	.....	.....	12	28	1,876	.....	.....	100	1,696	27,041
880	1,618	14,511	.....	587	217	713	2,397	6	317	89	.....	41	12	759	24,881
1,681	7,065	102,367	1,016	22,046	800	6,418	11,129	112	675	743	135	32	192	6,807	216,518
628	4,191	57,227	1,360	13,146	353	4,087	8,634	176	1,175	254	32	127	17	5,828	124,700
493	1,033	10,564	1,729	909	878	1,105	2,261	235	174	529	60	1,734	182	1,145	63,321
67,251	94,390	1,104,373	11,471	106,391	10,284	86,624	149,789	2,304	18,384	44,536	1,059	2,509	2,911	101,787	2,488,653
925	8,916	116,312	2,905	13,555	2,912	11,588	22,668	258	1,351	1,502	.....	661	670	6,205	214,736
133	1,070	12,962	621	258	99	1,268	2,276	182	106	120	.....	20	67	1,089	51,062
646	3,140	37,326	74	4,341	754	1,655	2,894	59	62	.....	.....	.....	23	150	50,080
356	2,177	29,297	151	192	2,184	2,816	5,517	88	532	353	18	24	48	1,203	49,048
140	612	7,929	207	89	.....	972	1,685	37	265	412	.....	38	19	223	22,401
$240,285	279,900	$3,584,649	$47,200	$495,109	$50,084	274,539	$528,696	$8,495	$84,553	$256,152	$97,600	$46,179	$153,457	$1,227,114	$10,396,341
$13,556	94,685	$987,187	$16,112	$12,718	$16,542	89,561	$141,640	$1,797	$21,555	$33,485	$507	$1,422	$3,192	$81,619	$2,030,443
372	1,408	22,423	.....	521	.....	1,070	2,638	.....	15	133	.....	42	1,159	227	39,330
10,618	48,033	531,943	134	46,314	652	38,499	53,665	2,039	2,336	6,518	44	639	10,578	20,605	897,486
1,911	10,776	157,386	565	9,538	11,360	7,638	20,824	14	6,108	1,160	.....	447	2,164	15,339	430,267
1,594	6,080	102,929	579	4,075	5,452	6,025	13,260	491	1,822	4,964	180	758	961	8,123	257,708
361	1,714	31,710	60	756	.....	1,695	3,752	156	490	372	.....	.....	20	1,443	74,161
1,303	1,420	15,964	92	508	358	1,137	1,919	26	126	248	.....	36	.....	929	46,889
329	581	6,339	.....	.....	.....	754	1,451	.....	58	.....	.....	.....	.....	857	11,916
1,312	66	664	.....	48	.....	26	37	.....	.....	.....	.....	.....	.....	.....	2,065
.....	246	2,008	.....	.....	.....	68	112	.....	.....	92	.....	.....	.....	25	5,069
8,334	11,561	182,701	984	10,453	91	7,975	17,084	330	1,200	1,298	1,266	1,981	1,605	8,442	294,536
6,324	22,893	278,357	228	339	.....	8,592	13,561	438	7,367	2,484	26	.....	265	8,855	387,296
945	11,407	160,068	2,464	2,234	376	13,604	26,575	118	1,811	5,644	18	265	2,110	7,832	265,441
$46,953	210,870	$2,479,679	$21,218	$87,504	$34,831	176,644	$296,518	$5,409	$42,888	$56,398	$2,041	$5,590	$21,994	$154,296	$4,742,607
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	6,401	$132,863	$31	$2,140	$800	8,269	$23,813	$270	$110	$23	$213	.....	.....	.....	$370
$19,778	50,406	635,034	7,616	6,924	1,046	27,514	46,845	2,017	13,908	6,049	46	$549	$1,243	$390	162,119
.....	5,576	65,086	830	.....	.....	2,394	5,156	228	83	14	.....	.....	.....	38,500	1,344,898
720	3,742	45,858	106	4,623	.....	2,682	4,364	11	306	.....	.....	.....	.....	569	76,642
.....	6,736	66,405	1,506	1,696	1,892	3,373	8,378	354	989	.....	.....	.....	.....	7	57,618
.....	317	4,851	.....	290	.....	148	278	.....	12	.....	.....	.....	200	1,867	98,043
.....	488	7,895	48	.....	.....	164	387	.....	.....	91	.....	.....	.....	.....	13,672
.....	13	273	.....	.....	.....	9	25	.....	.....	.....	.....	.....	.....	10	8,462
76	815	9,877	656	4,151	.....	620	1,157	168	.....	.....	.....	.....	.....	15	313
.....	49	1,100	26	.....	.....	75	278	.....	.....	.....	.....	.....	.....	362	16,677
.....	553	10,059	305	.....	.....	885	2,093	.....	.....	.....	.....	.....	.....	660	22,979
.....	692	7,881	426	18,706	.....	695	6,309	265	313	.....	.....	.....	.....	120	12,591
														117	31,022
$20,574	75,788	$987,182	$11,540	$38,530	$3,738	46,828	$94,083	$3,313	$15,721	$6,177	$259	$549	$1,443	$42,617	$1,845,406

Exports of India Rubber Manufactures from the United

	Belting Value	Hose Value	Packing Value	Thread Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Canvas Shoes with Rubber Soles Pairs	Canvas Shoes with Rubber Soles Value	Soles and Heels Value	Leather Cloth or Artificial Leather Value	Waterproofed and Auto Cloth and Auto Topping Value
ASIA													
Aden	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Armenia and Kurdistan	$517	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
British India	22,211	$12,531	$4,839	.....	24	$161	1,129	$723	17,317	$22,085	$643	$13,514	$1,300
Ceylon	.....	831	.....	.....	.....	.....	142	106	655	772	54	634	331
Straits Settlements	8,651	112	381	.....	.....	.....	216	155	7,814	5,921	.....	.....	.....
Other British East Indies	90	.....	.....	.....	.....	.....	144	122	.....	.....	.....	1,262	624
China	12,298	8,533	6,050	$2,281	385	1,024	33,177	28,539	5,522	5,858	318	34,853	29,093
Chosen	1,978	66	500	.....	.....	.....	1,224	1,046	288	246	.....	695	.....
Java and Madura	3,875	2,089	461	.....	.....	.....	100	81	1,179	1,129	683	8,990	11,155
Other Dutch East Indies	820	2,991	995	.....	.....	.....	.....	.....	39	30	.....	.....	.....
Far Eastern Republic	.....	396	265	.....	1,896	7,503	552	1,862	290	259	.....	.....	.....
French Indo-China	12,261	38	148	.....	.....	.....	144	192	360	421	.....	.....	.....
Greece in Asia	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	617	.....
Hejaz, Arabia, etc	66	15	.....	.....	100	254	.....	.....	.....	.....	.....	.....	.....
Hongkong	32	5,102	3,517	.....	258	630	2,248	2,334	4,905	4,495	200	3,677	570
Japan	18,977	18,047	70,218	117,871	74,784	181,584	142,678	123,014	17,516	12,858	284	33,301	17,677
Kwantung, leased Territory	.....	.....	.....	.....	.....	.....	.....	.....	240	231	.....	13,490	.....
Palestine and Syria	.....	90	42	.....	.....	.....	4,871	3,765	1,062	1,117	575	1,894	1,692
Persia	.....	.....	82	.....	.....	.....	300	360	.....	.....	.....	.....	.....
Russia in Asia	.....	.....	11	.....	3	32	3	23	.....	.....	.....	.....	.....
Siam	135	20	.....	.....	.....	.....	24	39	772	774	.....	351	.....
Turkey in Asia	.....	.....	.....	.....	.....	.....	360	315	.....	.....	.....	.....	.....
TOTALS, ASIA	$81,911	$50,867	$87,509	$120,152	77,450	$191,188	187,312	$162,676	57,959	$56,196	$2,757	$113,278	$62,442
OCEANIA													
Philippine Islands	$30,577	$34,184	$15,274	.....	1,099	$2,315	39,527	$29,476	590,207	$462,501	$80,813	$15,495	$21,744
Australia	44,285	24,780	33,584	.....	544	2,156	11,480	9,078	25,903	19,669	568	222,308	65,892
British Oceania	.....	.....	.....	.....	.....	.....	1,144	1,354	5,451	6,213	2	.....	219
French Oceania	2,236	612	950	.....	53	64	307	416	8,435	9,756	103	.....	229
New Zealand	18,412	12,913	8,617	.....	8,437	29,200	2,141	3,856	1,170	1,358	4,524	9,195	10,546
Other Oceania	.....	.....	73	.....	.....	.....	105	132	3,530	5,752	.....	.....	115
TOTALS, OCEANIA	$95,508	$72,489	$58,500	.....	10,133	$33,735	54,704	$44,312	634,696	$505,249	$86,010	$246,998	$98,745
Calendar year, 1922	$1,268,235	$1,340,244	$546,115	$1,193,301	241,919	$630,549	863,559	$751,486	2,977,627	$2,358,463	$699,135	$1,888,791	$893,853

	Belting Value	Hose Value	Packing Value	Thread Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Canvas Shoes with Rubber Soles Pairs	Canvas Shoes with Rubber Soles Value	Soles and Heels Value	Leather Cloth or Artificial Leather Value	Waterproofed and Auto Cloth and Auto Topping Value
Calendar year, 1921	$1,446,063	$1,945,300	$715,574	.....	213,180	$567,832	2,668,850	$2,829,109	.....	.....	$512,320	.....	.....
Calendar year, 1920	‡3,532,277	‡3,340,882	‡1,525,242	.....	302,852	1,012,099	10,088,511	9,738,390	.....	.....	‡984,235	.....	.....
	Belting, Hose and Packing												
Calendar year, 1919	.....	$6,100,460	.....	.....	261,110	$714,713	5,794,488	$4,551,386	.....	.....	.....	.....	.....
§Calendar year, 1918	.....	4,525,243	.....	.....	722,586	2,799,116	1,285,110	1,584,747	.....	.....	.....	.....	.....
‖Fiscal year, 1917-18	.....	4,578,396	.....	.....	1,559,598	4,861,213	1,244,170	913,128	.....	.....	.....	.....	.....
Fiscal year, 1916-17	.....	3,532,384	.....	.....	600,455	1,483,379	3,356,484	1,716,225	.....	.....	.....	.....	.....
Fiscal year, 1915-16	.....	2,986,953	.....	.....	720,130	1,619,260	1,976,896	1,046,102	.....	.....	.....	.....	.....
Fiscal year, 1914-15	.....	1,807,848	.....	.....	318,727	726,765	2,219,900	2,053,560	.....	.....	.....	.....	.....
Fiscal year, 1913-14	.....	2,372,887	.....	.....	101,361	279,206	1,634,258	834,289	.....	.....	.....	.....	.....
Fiscal year, 1912-13	.....	2,605,551	.....	.....	109,528	274,330	2,231,467	1,163,953	.....	.....	.....	.....	.....

‡ Druggists' rubber sundries were not specifically reported before 1917-18. § These figures are given for the calendar year ended December 31, 1918. ‖ Ended June 30, 1918. ¶ Not specifically reported before 1920. ‡‡ Does not contain scrap and reclaimed figures for 1922.

Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.

Exports of India Rubber Manufactures from the

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Thread Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Canvas Shoes with Rubber Soles Pairs	Canvas Shoes with Rubber Soles Value	Soles and Heels Value	Leather Cloth or Artificial Leather Value	Waterproofed Auto Cloth Value
EUROPE													
Belgium	$418	$155	$937	.....	.....	.....	2,175	$1,469	.....	.....	.....	$3,549	$4,805
Czechoslovakia	.....	581	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denmark	255	72	952	.....	.....	.....	1,161	985	27,915	$20,219	.....	1,533	1,354
Esthonia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Finland	1,765	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,008	.....
France	6,010	653	977	$21,712	2	$6	.....	.....	48	29	.....	17,120	.....
Germany	.....	.....	.....	.....	2,350	2,066	.....	.....	.....	.....	.....	.....	.....
Gibraltar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greece	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iceland and Faroe Islands	.....	.....	.....	.....	150	378	.....	.....	.....	.....	.....	.....	.....
Italy	.....	883	11	10,624	51	192	360	321	3,768	2,640	.....	4,233	.....
Jugoslavia, Albania	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malto, Gozo, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	353
Netherlands	555	553	.....	960	12	36	.....	.....	480	558	$57	1,470	265
Norway	11,692	1,546	.....	.....	303	513	4,755	4,103	27,458	18,361	254	5,393	1,071
Poland and Danzig	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portugal	.....	.....	.....	.....	222	868	.....	.....	.....	.....	.....	.....	.....
Spain	.....	.....	208	.....	48	144	.....	.....	.....	.....	303	2,150	.....
Sweden	1,586	300	.....	340	593	1,696	150	187	.....	.....	.....	15,148	.....
Switzerland	.....	.....	.....	2,902	.....	.....	246	218	.....	.....	.....	1,456	1,036
Turkey in Europe	.....	.....	.....	.....	.....	.....	22	27	.....	.....	.....	.....	.....
England	4,922	37,326	5,101	34,851	3,730	9,186	17,566	10,846	69,208	57,676	1,448	8,919	3,436
Scotland	2,817	.....	1,677	.....	.....	.....	.....	.....	3,600	2,181	.....	4,097	280
Ireland	.....	.....	.....	.....	.....	.....	.....	.....	5,525	3,822	.....	.....	.....
TOTALS, EUROPE	$30,020	$42,069	$9,863	$71,389	7,461	$15,085	26,435	$18,126	138,002	$105,486	$2,062	$66,076	$12,600

States by Countries During the Calendar Year 1922—(*Continued*)

Waterproofed Clothing Value	Pneumatic Casings: Automobile Number	Pneumatic Casings: Automobile Value	Pneumatic Casings: Others Value	Solid Tires: Automobile Value	Solid Tires: Others Value	Pneumatic Tubes: Automobile Number	Pneumatic Tubes: Automobile Value	Pneumatic Tubes: Others Value	Tire Repair Materials Value	Druggists' Rubber Sundries Value	Hard Rubber Goods: Battery Jars and Accessories Value	Hard Rubber Goods: Other Electrical Supplies Value	Hard Rubber Goods: Others Value	All Other Rubber Manufactures Value	Totals Value
.....	1,068	$10,518	.....	$66	.....	566	$870	.....	$19	.....	.....	.....	.....	.....	$11,467
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	517
$82	9,885	120,153	$2,376	72,624	$3,290	6,107	12,155	$708	4,372	$5,107	$152	.....	$31	$4,154	303,211
.....	900	12,468	567	1,296	608	249	470	23	334	.....	.....	.....	.....	1,043	19,537
.....	17,161	176,667	439	48,117	1,856	10,423	16,516	7	263	852	1,221	.....	43	2,474	263,675
58	75	138	.....	.....	.....	175	386	.....	258	14	.....	.....	.....	.....	2,952
5,205	4,517	71,015	200	5,758	170	3,358	7,242	104	3,476	16,591	1,727	$343	.....	15,682	256,360
.....	1,224	9,191	.....	.....	.....	1,664	4,154	.....	.....	157	.....	.....	.....	46	18,079
283	17,159	230,911	11,552	40,081	2,818	9,781	22,602	4,955	716	102	33	184	.....	4,152	346,852
.....	1,769	20,602	732	5,644	.....	1,169	2,375	888	27	.....	.....	.....	.....	217	35,321
4,380	162	3,120	.....	.....	.....	158	451	.....	377	74	.....	.....	30	235	18,942
.....	489	6,541	.....	.....	.....	348	1,232	40	913	90	.....	.....	.....	8	21,884
.....	51	1,495	.....	.....	452	40	129	.....	61	.....	.....	.....	.....	153	2,913
.....	2,325	27,041	.....	.....	.....	2,034	4,522	.....	150	.....	.....	.....	.....	42	32,090
1,070	334	6,618	131	2,795	1,465	224	498	55	1,447	3,362	.....	1,228	.....	5,729	44,955
1,365	7,938	123,792	814	35,382	241	1,212	2,732	903	3,905	12,357	513	16,704	6,056	82,931	881,526
.....	3	130	23	.....	.....	.....	.....	.....	.....	1,080	.....	.....	.....	1,523	16,477
2,430	10,594	121,575	.....	1,189	.....	7,937	15,746	10	1,825	1,079	.....	.....	.....	4,629	157,658
.....	154	1,635	.....	.....	.....	24	58	.....	.....	187	.....	.....	.....	.....	2,322
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66
.....	439	6,678	.....	617	.....	311	795	12	72	658	.....	303	.....	474	10,928
.....	50	584	.....	.....	.....	60	119	.....	.....	.....	.....	.....	.....	.....	1,018
$14,873	76,297	$950,872	$16,834	$213,563	$10,900	45,840	$93,052	$7,705	$18,215	$41,710	$3,646	$18,762	$6,150	$123,492	$2,448,750
$21,714	40,543	$565,178	$8,706	$79,294	$96,091	40,057	$86,788	$3,922	$9,362	$18,247	$384	$158	$1,357	$85,291	$1,668,871
10,734	41,384	667,881	8,330	125,242	7,750	21,319	49,377	546	14,583	21,113	1,477	509	3,639	44,207	1,377,706
15	683	11,109	.....	2,741	.....	681	1,507	.....	339	.....	12	.....	.....	864	24,375
178	262	4,333	596	1,493	1,115	183	425	151	183	.....	.....	.....	19	221	23,080
3,999	47,846	692,137	2,281	96,400	266	19,899	43,802	583	28,360	9,942	3,903	265	30	21,610	1,002,200
150	522	5,841	207	986	.....	302	488	23	45	56	.....	196	.....	16	14,082
$36,790	131,240	$1,946,479	$20,120	$306,156	$105,222	82,441	$182,387	$5,225	$52,872	$49,358	$5,776	$1,129	$5,045	$152,209	$4,110,314
$393,455	1,326,220	$16,604,459	$234,718	$1,518,932	$210,050	936,718	$1,775,229	$49,648	$310,034	$871,465	$133,796	$87,432	$386,993	$2,480,550	$36,626,931

	Automobiles Tires: Casings Value	Automobiles Tires: Inner Tubes Value	Automobiles Tires: Solid Tires Value	Automobiles Tires: All Others Value	Scrap and Old: Pounds	Scrap and Old: Value	Reclaimed: Pounds	Reclaimed: Value	Druggists' Rubber Sundries Value	All Other Rubber Manufactures Value	Totals Value
.....	$13,422,266	$1,232,168	$1,300,081	$358,963	7,837,434	$423,602	1,255,261	$154,656	$874,813	$5,003,162	$30,785,909
.....	43,899,502	4,812,980	3,331,789	1,029,744	10,468,538	788,097	4,909,214	828,694	1,890,957	8,722,009	85,436,897

	Tires: Automobile Value	Tires: All Others Value								
.....	$28,924,655	$1,557,227	$8,292,053	$808,993	5,070,632	$839,938	$1,270,506	.....	.....	$9,097,773	$53,865,655
.....	14,511,621	755,888	2,931,929	287,882	2,944,234	502,176	772,539	.....	.....	5,762,079	31,501,292
.....	13,977,671	1,130,623	2,117,257	235,811	3,284,958	567,278	$884,245	.....	.....	6,194,816	33,343,181
.....	12,330,201	2,547,652	3,696,661	415,526	4,938,991	814,199	.....	.....	.....	8,265,509	31,105,075
.....	17,936,227	3,003,077	3,904,715	400,148	6,406,946	871,262	.....	.....	.....	7,290,345	35,153,374
.....	4,963,270	576,602	2,422,091	291,421	5,970,380	822,561	.....	.....	.....	3,525,486	14,767,513
.....	3,505,267	563,372	6,207,672	598,287	5,583,860	834,440	.....	.....	.....	3,453,472	12,441,220
.....	3,943,220	611,458	7,269,465	880,442	5,413,247	932,904	.....	.....	.....	3,913,036	14,324,894

United States by Countries During February, 1923

Waterproofed Clothing Value	Pneumatic Casings: Automobile Number	Pneumatic Casings: Automobile Value	Pneumatic Casings: Others Value	Solid Tires: Automobile and Motor Truck Value	Solid Tires: Others Value	Pneumatic Tubes: Automobile Number	Pneumatic Tubes: Automobile Value	Pneumatic Tubes: Others Value	Tire Repair Materials Value	Druggists' Rubber Sundries Value	Hard Rubber Goods: Battery Jars and Accessories Value	Hard Rubber Goods: Other Electrical Supplies Value	Hard Rubber Goods: Others Value	All Other Rubber Manufactures Value	Totals Value
.....	852	$10,890	$105	.....	.....	421	$1,074	.....	.....	.....	.....	.....	.....	$581	$23,983
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	581
.....	4,841	63,608	1,880	$2,602	.....	5,903	9,140	$508	$417	$2,750	.....	.....	.....	1,143	107,388
.....	6	110	.....	.....	.....	8	45	.....	.....	.....	.....	.....	.....	15	170
.....	158	2,679	.....	.....	.....	186	555	13	.....	.....	.....	.....	.....	.....	6,020
.....	41	1,065	.....	501	.....	.....	.....	.....	.....	4,022	.....	.....	$1,888	3,275	57,258
.....	264	3,822	.....	.....	.....	335	671	.....	.....	.....	.....	.....	.....	391	7,010
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,519	1,519
.....	689	7,186	.....	604	.....	294	503	.....	.....	.....	.....	.....	.....	24	8,317
.....	10	80	.....	.....	.....	33	60	.....	.....	.....	.....	.....	.....	.....	518
.....	1,850	23,642	20	.....	.....	745	1,136	150	.....	414	.....	.....	.....	7,415	51,681
.....	79	1,260	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,260
.....	28	459	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	812
.....	1,357	17,990	649	.....	.....	906	1,370	263	90	437	$115	.....	.....	879	26,247
.....	3,987	62,487	1,909	3,215	.....	3,357	6,814	584	.....	1,501	.....	.....	.....	587	120,030
.....	100	1,019	.....	.....	.....	50	90	.....	.....	.....	.....	.....	.....	.....	1,109
.....	90	758	.....	.....	.....	10	14	.....	89	.....	.....	.....	.....	.....	1,729
.....	1,166	20,583	.....	13,185	.....	744	2,018	.....	38	755	.....	.....	.....	1,895	41,279
.....	7,474	96,657	4,311	229	.....	3,816	5,543	228	404	2,296	.....	.....	.....	1,820	130,745
.....	376	5,979	30	.....	.....	166	466	20	.....	694	.....	.....	.....	228	13,029
.....	15	266	.....	.....	.....	.....	.....	.....	11	.....	.....	.....	.....	25	329
.....	17,664	182,340	20,288	36,783	$120	11,688	17,805	.....	140	24,730	576	.....	8,017	53,590	518,100
$1,767	527	3,312	1,256	2,476	.....	.....	.....	.....	.....	1,200	.....	.....	.....	1,119	22,182
.....	344	2,818	2,062	.....	.....	525	691	.....	.....	.....	.....	.....	.....	650	9,983
$1,767	41,918	$509,070	$32,450	$59,595	$120	29,187	$47,995	$1,766	$1,189	$38,799	$691	.....	$9,905	$75,156	$1,151,279

Exports of India Rubber Manufactures from the United

	Belting Value	Hose Value	Packing Value	Thread Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Canvas Shoes with Rubber Soles Pairs	Canvas Shoes with Rubber Soles Value	Soles and Heels Value	Leather Cloth or Artificial Leather Value	Waterproofed Auto Cloth Value
NORTH AMERICA													
Canada—Maritime Provinces	$545	$674	.....	.....	1,558	$5,352	80	$54	1,800	$1,786	.....	.....	.....
Quebec and Ontario	11,326	6,225	$4,458	$2,030	268	756	68	154	695	916	$1,716	$21,415	$17,771
Prairie Provinces	1,609	384	43	.....	.....	.....	.....	.....	.....	.....	.....	173	1,137
Brit. Columbia and Yukon	1,865	345	170	.....	1,029	4,305	10	10	148	164	.....	382	113
British Honduras	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	90	.....	.....
Costa Rica	.....	263	84	.....	.....	.....	12	10	122	126	728	.....	.....
Guatemala	731	407	101	.....	.....	.....	.....	.....	336	317	173	118	324
Honduras	747	1,040	167	125	12	32	144	153	294	295	1,055	.....	555
Nicaragua	1,236	45	208	.....	.....	.....	16	15	982	946	1,320	.....	.....
Panama	.....	495	43	.....	276	766	95	69	4,840	4,008	338	.....	.....
Salvador	467	.....	.....	.....	.....	.....	130	95	.....	.....	1,916	.....	.....
Mexico	11,475	12,162	4,940	167	51	90	4,951	3,243	35,014	29,234	8,806	863	1,369
Miquelon and St. Pierre Islands	.....	.....	15	.....	408	1,152	144	113	.....	.....	.....	.....	.....
Newfoundland and Labrador	1,815	388	.....	.....	8,228	22,954	743	642	242	216	1,788	45	.....
Bermuda	.....	909	12	.....	41	121	8	12	218	214	77	.....	.....
Barbados	.....	.....	.....	.....	.....	.....	.....	.....	93	78	.....	.....	.....
Jamaica	.....	855	.....	.....	.....	.....	72	65	1,898	1,942	.....	86	162
Trinidad and Tobago	44	177	16	.....	.....	.....	192	122	960	584	.....	94	761
Other British West Indies	383	580	70	.....	.....	.....	.....	.....	821	684	47	90	.....
Cuba	1,618	13,224	3,542	.....	.....	.....	5,960	4,716	66,751	45,189	7,233	3,929	9,142
Dominican Republic	921	120	790	.....	.....	.....	.....	.....	399	338	425	.....	57
Dutch West Indies	.....	.....	13	.....	.....	.....	54	59	3,983	3,056	10	.....	.....
French West Indies	.....	.....	.....	.....	.....	.....	12	17	474	222	64	.....	82
Haiti	53	377	39	.....	.....	.....	.....	.....	.....	.....	.....	94	.....
Virgin Islands of United States	23	.....	.....	.....	.....	.....	.....	.....	246	106	14	.....	.....
TOTALS, NORTH AMERICA	$34,858	$38,678	$14,711	$2,322	11,871	$35,528	12,691	$9,549	120,316	$90,421	$25,800	$27,289	$31,473
SOUTH AMERICA													
Argentina	$2,866	$4,596	$72	.....	.....	.....	2,124	$2,840	26,000	$19,062	$5,375	$3,068	$19,894
Bolivia	.....	378	.....	.....	.....	.....	.....	.....	.....	.....	180	.....	.....
Brazil	2,446	3,466	736	.....	.....	.....	.....	.....	120	215	.....	1,024	531
Chile	3,214	8,800	60	.....	36	$106	3,866	2,553	2,472	1,407	.....	4,274	1,370
Colombia	561	688	1,586	.....	.....	.....	.....	.....	149	146	2,033	323	157
Ecuador	255	13	11	.....	.....	.....	87	101	.....	.....	11	.....	.....
British Guiana	.....	66	139	.....	.....	.....	.....	.....	431	336	.....	.....	157
Dutch Guiana	.....	74	.....	.....	.....	.....	.....	.....	300	306	19	.....	.....
Peru	.....	177	217	.....	.....	.....	.....	.....	.....	.....	.....	298	295
Uruguay	338	.....	336	.....	.....	.....	310	194	1,818	1,359	2,250	1,867	563
Venezuela	30	1,289	537	.....	.....	.....	.....	.....	.....	.....	1,260	2,956	151
TOTALS, SOUTH AMERICA	$9,513	$19,547	$3,694	.....	36	$106	6,387	$5,688	31,290	$22,831	$11,128	$13,810	$23,118
ASIA													
Aden	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
British India	$5,114	$1,595	$205	.....	98	$197	1,061	$1,048	1,548	$1,566	$225	$1,863	$1,582
Ceylon	.....	125	.....	.....	.....	.....	.....	.....	.....	.....	272	.....	.....
Straits Settlements	.....	194	109	.....	.....	.....	.....	.....	340	258	5	.....	.....
China	235	501	323	.....	.....	.....	1,464	1,244	9,072	7,211	153	1,504	666
Chosen	283	10	229	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Java and Madura	1,062	628	.....	.....	.....	.....	.....	.....	60	40	.....	.....	689
Other Dutch East Indies	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hejaz, Arabia, etc.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hongkong	.....	78	.....	$250	.....	.....	.....	.....	1,680	1,346	.....	.....	85
Japan	144	1,591	9,436	5,392	572	1,235	1,004	1,355	96	65	.....	818	.....
Kwantung, leased Territory	45	.....	137	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palestine and Syria	.....	494	.....	.....	.....	.....	22	19	.....	.....	.....	.....	87
Persia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Siam	136	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Asia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS, ASIA	$7,019	$5,216	$10,439	$5,642	670	$1,432	3,551	$3,666	12,796	$10,486	$655	$4,185	$3,109
OCEANIA													
Philippine Islands	$1,322	$2,577	$1,081	.....	.....	.....	.....	.....	60,362	$45,457	$2,767	$430	$1,226
Australia	11,807	2,101	1,515	.....	132	$461	496	$458	306	612	131	22,705	3,818
British Oceania	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
French Oceania	.....	53	.....	.....	.....	.....	.....	.....	300	369	.....	.....	40
New Zealand	1,735	1,121	812	.....	2,785	9,475	445	936	.....	.....	.....	1,656	1,737
Other Oceania	.....	.....	.....	.....	.....	.....	144	220	374	606	.....	.....	.....
TOTALS, OCEANIA	$14,864	$5,852	$3,408	.....	2,917	$9,936	1,085	$1,614	61,342	$47,044	$2,898	$24,791	$6,821
AFRICA													
Belgian Kongo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
British West Africa	.....	.....	.....	.....	.....	.....	.....	.....	120	$156	.....	.....	.....
British South Africa	$10,957	$7,073	$1,266	$69	4,671	$12,165	360	$291	1,260	1,072	$1,472	$2,291	$2,662
British East Africa	6,986	.....	89	.....	.....	.....	.....	.....	.....	.....	70	250	.....
Canary Islands	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	135	.....
Egypt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	196	199
Algeria and Tunis	1,062	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other French Africa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portuguese East Africa	.....	.....	619	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Portuguese Africa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spanish Africa	.....	.....	113	.....	.....	.....	.....	.....	.....	.....	.....	.....	389
TOTALS, AFRICA	$19,005	$7,073	$2,087	$69	4,671	$12,165	360	$291	1,380	$1,228	$1,542	$2,872	$3,250
GRAND TOTALS	$115,279	$118,435	$44,202	$79,422	27,626	$74,252	50,509	$38,934	365,126	$277,496	$44,085	$139,023	$80,371

Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.

States by Countries During February, 1923—*Continued*

Waterproofed Clothing Value	Pneumatic Casings: Automobile Number	Pneumatic Casings: Automobile Value	Pneumatic Casings: Others Value	Solid Tires: Automobile and Motor Truck Value	Solid Tires: Others Value	Pneumatic Tubes: Automobile Number	Pneumatic Tubes: Automobile Value	Pneumatic Tubes: Others Value	Tire Repair Materials Value	Druggists' Rubber Sundries Value	Hard Rubber Goods: Battery Jars and Accessories Value	Hard Rubber Goods: Other Electrical Supplies Value	Hard Rubber Goods: Others Value	All Other Rubber Manufactures Value	Totals Value
$441	50	$298	.....	.....	.....	36	$39	.....	.....	.....	.....	$334	.....	$2,159	$11,682
1,237	4,641	50,845	$637	$5,957	$484	2,631	3,437	.....	$4,485	$20,650	$6,958	1,279	$3,704	67,878	234,318
928	773	6,887	2	166	.....	670	628	$18	556	3,871	50	294	343	6,086	23,175
421	199	2,462	.....	354	4	179	311	.....	56	560	.....	.....	625	3,612	15,759
11	38	446	.....	.....	.....	36	64	.....	.....	.....	.....	.....	.....	43	656
237	105	1,821	.....	.....	82	120	251	.....	.....	.....	.....	.....	.....	104	3,706
.....	4	100	33	.....	.....	.....	.....	.....	32	23	.....	.....	.....	87	2,446
102	78	1,439	.....	.....	.....	60	94	.....	230	206	.....	27	.....	385	6,652
.....	41	830	.....	.....	.....	72	178	.....	.....	9	.....	.....	.....	276	5,063
184	764	9,962	487	600	56	429	722	.....	20	856	270	.....	304	690	19,910
.....	222	6,073	.....	213	.....	90	294	.....	.....	.....	.....	.....	.....	202	9,260
8,963	16,610	169,816	1,748	3,256	963	6,604	12,157	119	1,227	2,821	.....	1,767	1,809	12,677	289,672
53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	1,433
3,524	27	398	.....	.....	.....	25	42	.....	.....	50	.....	.....	.....	548	32,410
176	.....	.....	.....	.....	233	.....	.....	.....	.....	7	.....	.....	.....	.....	1,761
.....	83	1,335	.....	.....	.....	75	120	5	.....	11	.....	.....	.....	.....	1,549
.....	366	4,107	189	2,120	.....	303	547	40	327	51	.....	.....	.....	419	10,910
.....	405	2,222	.....	.....	.....	218	438	.....	3	25	.....	.....	103	388	4,977
11	195	1,955	43	117	41	288	394	12	234	164	.....	.....	.....	555	5,380
14,450	5,936	66,898	2,192	17,101	.....	2,094	4,438	61	579	4,207	.....	.....	375	6,788	205,682
88	262	3,748	.....	595	72	660	960	.....	349	67	229	40	7	372	9,178
18	150	1,569	109	.....	.....	128	220	.....	.....	8	.....	.....	.....	51	5,113
.....	127	1,289	.....	223	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,897
.....	124	1,265	9	.....	388	87	180	31	45	4	.....	.....	.....	94	2,579
.....	51	501	.....	.....	.....	72	109	.....	29	.....	.....	.....	.....	1	783
$30,844	31,251	$336,260	$5,449	$30,702	$2,363	14,877	$25,623	$286	$8,172	$33,590	$7,507	$3,741	$7,270	$103,515	$905,951
$35	12,893	$131,282	.....	$1,830	$2,572	12,526	$18,238	$203	$1,258	$3,110	.....	.....	$342	$7,579	$224,222
.....	130	2,092	.....	.....	.....	80	192	.....	5	.....	.....	.....	.....	.....	2,847
.....	3,397	32,977	.....	163	.....	1,583	1,766	.....	250	2,345	.....	$61	317	6,297	52,594
.....	1,700	20,382	.....	748	562	634	1,293	.....	385	110	.....	1,503	.....	596	47,363
36	1,069	12,998	$139	188	363	1,044	1,804	38	176	384	.....	401	79	1,463	23,366
.....	54	1,725	.....	369	.....	32	167	20	12	.....	.....	42	.....	15	2,741
180	2	23	.....	246	.....	.....	.....	.....	.....	.....	.....	.....	.....	127	1,274
.....	80	636	7	.....	.....	16	20	.....	.....	.....	.....	.....	.....	.....	1,062
2,367	1,328	19,484	.....	759	798	755	1,462	.....	171	545	$62	256	.....	1,410	28,301
2,894	4,017	53,280	.....	.....	.....	928	1,409	.....	.....	250	.....	.....	.....	534	65,274
.....	384	5,340	36	54	72	626	1,073	.....	62	84	.....	.....	2,161	518	15,623
$5,512	25,054	$280,219	$182	$4,357	$4,367	18,224	$27,424	$261	$2,319	$6,828	$62	$2,263	$2,899	$18,539	$464,667
.....	102	$913	.....	.....	.....	114	$130	.....	$21	.....	.....	.....	.....	.....	$1,064
.....	2,103	21,932	.....	$2,086	$304	1,137	1,737	.....	195	.....	.....	.....	$291	$803	40,743
.....	1,085	8,542	$97	2,253	.....	286	341	.....	2	.....	$91	.....	.....	.....	11,723
.....	2,041	18,117	317	4,672	.....	1,356	1,884	.....	.....	.....	.....	.....	.....	1,008	26,564
.....	588	8,692	1,493	296	.....	354	698	.....	512	$380	64	.....	.....	1,066	25,038
.....	15	158	61	.....	.....	12	25	.....	.....	.....	.....	.....	.....	.....	766
.....	2,065	22,000	404	8,704	566	1,140	1,313	$129	147	55	.....	.....	.....	.....	35,737
.....	77	1,352	.....	590	.....	58	128	.....	.....	.....	.....	.....	.....	.....	2,070
.....	349	2,713	.....	.....	.....	244	294	.....	16	.....	.....	.....	.....	47	3,070
$180	109	2,564	96	233	.....	70	81	14	.....	60	.....	.....	.....	1,182	6,169
496	4,311	50,200	778	16,830	.....	1,620	2,794	63	1,648	571	.....	.....	.....	7,325	100,741
.....	100	988	.....	.....	.....	235	370	.....	.....	.....	.....	.....	.....	.....	1,546
.....	330	3,889	7	.....	285	182	303	2	.....	.....	.....	.....	.....	35	5,121
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	.....	.....	.....	75
.....	32	319	.....	.....	.....	.....	.....	.....	170	.....	.....	.....	.....	.....	625
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	.....	.....	.....	.....	35
$676	13,307	$142,379	$3,253	$35,664	$1,155	6,808	$10,098	$208	$2,711	$1,176	$155	.....	$291	$11,466	$261,081
$4,487	3,841	$42,810	$589	$26,346	$5,736	3,458	$6,631	$150	$425	$1,840	.....	.....	$86	$3,616	$147,576
720	4,865	83,844	402	25,371	2,126	1,973	3,709	61	2,168	2,329	$259	$40	77	3,363	168,077
.....	23	233	.....	17	.....	20	46	.....	.....	.....	.....	.....	.....	.....	296
64	40	525	65	230	12	38	74	.....	12	.....	.....	.....	.....	.....	1,444
111	7,060	93,752	330	6,371	.....	3,347	6,539	.....	1,129	245	653	78	42	2,455	129,177
.....	16	256	71	.....	.....	63	119	.....	56	.....	.....	.....	20	.....	1,348
$5,382	15,845	$221,420	$1,457	$58,335	$7,874	8,899	$17,118	$211	$3,790	$4,414	$912	$118	$225	$9,434	$447,918
.....	.....	.....	.....	.....	.....	.....	.....	.....	$31	.....	.....	.....	.....	.....	$31
.....	64	$790	.....	.....	.....	74	$133	.....	.....	.....	.....	.....	.....	$471	1,550
$3,309	3,412	34,001	$174	$63	$63	2,861	4,993	$289	704	$484	$1,837	.....	.....	1,815	87,050
.....	213	2,109	.....	75	.....	188	416	61	.....	.....	.....	.....	.....	23	10,079
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	135
.....	305	2,807	.....	.....	.....	23	48	.....	.....	.....	.....	.....	.....	.....	3,250
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,062
.....	4	30	.....	.....	.....	4	8	.....	.....	.....	.....	.....	.....	.....	38
.....	62	1,006	.....	.....	.....	124	269	.....	.....	.....	.....	.....	.....	.....	1,894
.....	95	1,395	18	955	.....	8	47	.....	.....	.....	.....	.....	.....	.....	2,415
.....	56	823	.....	355	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,680
$3,309	4,211	$42,961	$192	$1,448	$63	3,282	$5,914	$350	$735	$484	$1,837	.....	.....	$2,309	$109,184
$47,490	131,586	$1,532,309	$42,983	$190,101	$15,942	81,277	$134,172	$3,082	$18,916	$85,291	$11,164	$6,122	$20,590	$220,419	$3,340,800

Official India Rubber Statistics for the United States

Imports of Crude and Manufactured Rubber

	November, 1921		November, 1922	
	Pounds	Value	Pounds	Value
UNMANUFACTURED—*free*				
Crude rubber				
From France	89,113	$11,513	37,495	$4,390
Netherlands	4,549,385	707,708	989,353	184,636
Portugal	19,905	1,991	.....	.....
United Kingdom	8,451,013	1,261,566	7,002,686	1,193,242
Canada	.....	.....	218,699	50,138
Central America	10,872	1,579	13	3
Mexico	.....	.....	145	30
Brazil	1,631,762	226,933	1,800,134	333,790
Peru	.....	.....	4,595	751
Other South America	31,784	8,615	164,972	57,167
British East Indies	30,645,164	4,727,967	35,227,615	4,678,186
Dutch East Indies	5,348,071	667,480	7,837,341	1,192,803
Other countries	944,155	106,292	1,060,611	142,715
Totals	51,741,184	$7,721,644	54,343,659	$7,837,851
Balata	222,127	127,411	340,347	127,718
Jelutong (Pontianak)	330,927	29,609	205,100	15,203
Gutta percha	111,208	17,080	89,102	14,792
Rubber scrap	459,224	19,456	840,839	26,510
Totals, unmanufactured	52,864,670	$7,915,200	55,819,047	$8,023,074
Chicle	403,563	$189,212	.....	.....
MANUFACTURED—*dutiable*				
Rubber belting	.....	.....	19,291	$28,061
Other manufactures of and substitutes for rubber	.....	$172,805	54,562	44,517

Exports of Domestic Merchandise

MANUFACTURED				
India rubber				
Reclaimed	274,709	$30,179	413,076	$36,583
Scrap and old	879,651	52,075	609,239	20,123
Footwear				
Boots[1] ....*pairs*	7,319	16,451	22,926	55,082
Shoes[1] ....*pairs*	122,790	106,402	97,764	81,008
Canvas shoes with rubber soles[1] ....*pairs*	.....	.....	255,463	203,124
Druggists' rubber sundries[1]	.....	62,217	57,174	61,775
Hard rubber goods				
Battery jars and accessories[1]	.....	.....	53,148	7,243
Other electrical supplies[1]	.....	.....	46,340	12,215
Other hard rubber goods[1]	.....	.....	56,239	42,675
Tires				
Pneumatic casings				
For automobiles[1]	.....	1,474,056	107,966	1,257,018
Other[1]	.....	.....	4,185	21,854
Pneumatic tubes				
For automobiles[1]	.....	115,347	79,538	135,040
Other[1]	.....	.....	3,040	3,577
Solid tires				
For automobile and motor trucks[1]	.....	88,211	7,188	182,725
Other[1]	.....	.....	54,775	12,396
All other tires[1]	.....	15,608	.....	.....
Tire repair materials[1]	.....	.....	57,817	27,342
Belting[1]	.....	53,051	356,445	161,409
Hose[1]	.....	91,376	392,982	202,343
Packing[1]	.....	43,859	120,633	58,816
Soles and heels[1]	.....	49,450	217,698	82,980
Thread[1]	.....	.....	71,897	72,183
Other rubber manufactures[1]	.....	395,237	452,804	217,863
Totals, manufactured	.....	$2,593,519	.....	$2,955,374

Exports of Foreign Merchandise

	November, 1921		November, 1922	
	Pounds	Value	Pounds	Value
UNMANUFACTURED				
India rubber	1,041,940	$172,313	1,240,262	$278,840
Balata	340,197	205,367	153,281	101,230
Jelutong (Pontianak)	.....	.....	.....	.....
Totals, unmanufactured	1,382,137	$377,680	1,393,543	$380,070
MANUFACTURED				
Gutta percha and india rubber	.....	846	.....	.....
India rubber substitutes	20,483	3,217	.....	.....
Totals, manufactured	20,483	$4,063	.....	.....

[1]Details of exports of domestic merchandise by countries during November, 1922, appeared on pages 334 to 337 of our February issue.

Custom House Statistics

New York

Imports

	December, 1921		December, 1922	
UNMANUFACTURED—*free*	Pounds	Value	Pounds	Value
Crude rubber				
From Belgium	495,005	$55,502	560,572	$88,286
France	484,906	52,705	145,000	24,316
Germany	.....	.....	88,115	14,443
Netherlands	2,599,485	551,453	2,044,993	419,392
England	6,278,293	1,009,332	1,971,750	420,447
Quebec	.....	.....	1,095	235
Cuba	.....	.....	21,967	3,955
Argentina	.....	.....	136,455	16,995
Brazil	1,612,303	234,951	5,065,470	656,618
Chile	.....	.....	24,078	6,455
Colombia	2,593	766	23,311	3,763
Ecuador	32,110	11,850	253,486	13,260
British Guiana	5,280	3,064	.....	.....
Peru	.....	.....	23,959	6,293
Uruguay	.....	.....	66,774	11,193
Venezuela	11,237	6,170	22,400	3,508
British India	47,793	5,346	.....	.....
Ceylon	.....	.....	7,706,753	1,240,988
Straits Settlements	23,806,202	3,026,833	44,197,692	6,487,787
Java	.....	.....	3,784,496	559,876
British East Indies	6,170,677	861,028	.....	.....
Dutch East Indies	12,909,028	2,123,714	4,388,383	677,900
Hongkong	152,320	30,464	.....	.....
Japan	22,400	3,808	354,000	63,636
Philippine Islands	.....	.....	53,277	10,386
Far East Republic	1,722,437	120,612	.....	.....
Totals	56,352,069	$8,097,598	70,934,028	$10,729,732
Balata	258,083	153,162	100,980	56,730
Jelutong (Pontianak)	1,487,452	129,731	1,126,589	90,982
Gutta percha	362,340	47,459	124,725	18,087
Totals	58,459,944	$8,427,950	72,286,322	$10,895,531
Rubber scrap and reclaimed	401,909	32,842	691,559	12,315
Totals, unmanufactured	58,861,853	$8,460,792	72,977,881	$10,907,846
MANUFACTURED				
Rubber belting for machinery, *dutiable*	.....	$96,931	2,963	$7,880
Other manufactures of rubber and substitutes....*dutiable*	6,760	676	.....	114
Chicle .....*dutiable*	131,404	61,368	775,950	413,529

Exports

	December, 1921		December, 1922	
MANUFACTURED	Pounds	Value	Pounds	Value
Rubber scrap and reclaimed	752,392	$48,481	601,162	$26,932
Automobile and other tires, *number*	.....	1,022,133	130,800	1,067,013
Inner tubes .....*number*	.....	73,931	67,322	106,127
Tire repair materials	.....	.....	46,842	18,929
Boots and shoes.....*pairs*	114,912	105,978	39,333	48,476
Canvas shoes with rubber soles .....*pairs*	.....	18,469	184,588	135,833
Soles and heels	.....	.....	155,142	66,620
Battery jars and accessories	.....	.....	7,221	1,421
Other electrical supplies	.....	.....	9,519	4,126
Other hard rubber goods	.....	.....	20,990	19,785
Druggists' rubber sundries	.....	32,404	51,215	47,861
Belting, hose and packing	.....	124,074	471,020	213,687
Thread	.....	.....	77,998	73,183
Other rubber manufactures	.....	192,408	180,079	110,430
Totals, manufactured	.....	$1,617,878	.....	$1,940,423

Foreign Exports

Crude rubber	27,974	$17,410	24,429	$6,733
Balata	41,140	23,270	166,683	115,620
Gutta percha	.....	.....	.....	.....
Rubber, scrap and reclaimed	.....	.....	.....	.....
Rubber manufactures	.....	1,855	.....	.....
Chicle	2	3	.....	.....
Rubber substitutes	1,699	2,000	.....	.....

Imports of Crude Rubber Into the United States by Customs Districts

	December, 1921		December, 1922	
	Pounds	Value	Pounds	Value
Massachusetts	743,100	$85,316	1,836,394	$302,470
Buffalo	325	83	.....	.....
New York	56,352,069	8,097,598	70,934,028	10,729,732
Los Angeles	1,333,166	156,752	1,453,525	197,137
San Francisco	216,161	30,595	436,655	97,981
Oregon	.....	.....	112,000	13,407
Michigan	.....	.....	112,005	29,204
Colorado	.....	.....	280,017	41,028
Totals	58,644,821	$8,370,344	75,164,624	$11,410,959

United Kingdom Rubber Statistics

Imports

UNMANUFACTURED	February, 1922 Pounds	February, 1922 Value	February, 1923 Pounds	February, 1923 Value
Crude rubber From—				
Straits Settlements	1,074,000	£44,902	5,523,100	£326,902
Federated Malay States	3,952,300	183,802	2,538,800	148,510
British India	776,600	34,717	1,022,600	62,296
Ceylon and Dependencies	2,514,600	111,598	2,546,100	166,010
Other Dutch Possessions in Indian Seas	94,400	4,374	183,700	12,170
Dutch East Indies (except Other Dutch Possessions in Indian Seas)	664,500	28,880	935,900	54,403
Other countries in East Indies and Pacific not elsewhere specified	34,100	1,715	126,900	9,220
Brazil	665,700	28,792	985,700	60,955
South and Central America (except Brazil and Peru)	49,300	1,950	55,500	2,777
West Africa				
French West Africa	.....	.....	11,200	502
Gold Coast	200	6	5,600	257
Other Parts of West Africa	20,700	818	.....	.....
East Africa, including Madagascar	2,600	53	31,300	1,072
Other countries	25,600	1,208	103,900	6,808
Totals	9,874,600	£442,815	14,070,300	£851,882
Waste and reclaimed rubber	61,000	731	268,500	4,359
Gutta percha and balata	369,600	49,411	983,200	126,031
Rubber substitutes	.....	.....	.....	.....
Totals, unmanufactured	10,305,200	£492,957	15,322,000	£982,272
MANUFACTURED				
Boots and shoes....*doz. pairs*	15,463	£36,126	15,894	£23,659
Tires and tubes				
Pneumatic				
Outer covers	.....	355,737	.....	234,686
Inner tubes	.....	30,990	.....	30,412
Solid tires	.....	11,989	.....	13,007
Other rubber manufactures	.....	66,725	.....	65,347
Totals, manufactured	.....	£501,567	.....	£167,111

Exports

UNMANUFACTURED				
Waste and reclaimed rubber	426,100	£6,436	745,000	£10,821
Rubber substitutes	64,100	1,591	103,200	2,194
Totals, unmanufactured	490,200	£8,027	848,200	£13,015
MANUFACTURED				
Boots and shoes....*doz. pairs*	6,658	£13,142	10,450	£19,794
Tires and tubes				
Pneumatic				
Outer covers	.....	81,245	.....	104,025
Inner tubes	.....	16,394	.....	19,949
Solid tires	.....	22,021	.....	24,758
Other rubber manufactures	.....	229,534	.....	229,078
Totals, manufactured	.....	£362,336	.....	£397,604

Exports—Colonial and Foreign

UNMANUFACTURED	February, 1922 Pounds	February, 1922 Value	February, 1923 Pounds	February, 1923 Value
Crude rubber				
To Sweden, Norway and Denmark	99,100	£3,848	280,700	£16,515
Germany	1,623,600	65,805	499,100	36,143
Belgium	301,300	13,379	392,900	25,170
France	2,512,000	108,528	3,324,600	228,111
Spain	162,900	6,696	79,900	5,252
Italy	303,900	13,153	766,400	53,135
Austria	22,500	748	.....	.....
Other European countries	182,200	8,547	166,200	14,173
United States	9,176,100	421,821	7,743,100	526,129
Canada	190,200	7,010	846,500	61,637
Other countries	6,700	310	23,500	2,594
Totals	14,580,500	£649,845	14,122,900	£968,859
Waste and reclaimed rubber	145	345	264	127
Gutta percha and balata	447	6,038	957	15,735
Rubber substitutes	139	285	.....	.....
Totals, unmanufactured	14,581,231	£656,513	14,124,121	£984,721
MANUFACTURED				
Boots and shoes....*doz. pairs*	156	£841	27	£131
Tires and tubes				
Pneumatic				
Outer covers	.....	15,150	.....	21,304
Inner tubes	.....	2,120	.....	3,090
Solid tires	.....	96	.....	1,607
Other rubber manufactures	.....	3,286	.....	2,130
Totals, manufactured	.....	£21,493	.....	£28,262

The Market for Rubber Scrap

New York

There is practically no market for scrap rubber at present, and some of the grades are considerably lower than a month ago. Reclaimers are stocked for present needs and are not purchasing in quantity.

BOOTS AND SHOES. The tendency to lower prices has been marked. New business is lacking even at the decline, which amounts to ¼ to ¾-cent a pound on the several grades.

HOSE. Business is dull and prices nominal. There is a moderate demand for air brake hose and practically none for other grades.

INNER TUBES. Business is very slack in all grades, with quotations on all grades at marked reduction over a month ago as follows: No. 1 tubes, 1 cent less; compounded gray, ½ cent less, and red, 1 cent less.

MECHANICALS. Without interest, at nominal quotations.

Quotations for Carload Lots Delivered

April 26, 1923

Prices subject to change without notice

Boots and Shoes		
Boots and shoes, black	lb.	$0.03½@$0.03⅝
Trimmed arctics	lb.	.02¾@ .03
Untrimmed arctics	lb.	.02¼@ .02½
Hard Rubber		
Battery jars, black compound	lb.	.02 @ .02½
No. 1 scrap	lb.	.09 @ .10
Inner Tubes		
No. 1	lb.	.05 @ .05½
Compound red	lb.	.03½@ .04
Mechanicals		
Black scrap, mixed	lb.	.01½@
Heels	lb.	.00¾@ .01
Horse-shoe pads	lb.	.03 @ .03½
Hose, air brake	lb.	.01½@ .01¾
regular	lb.	.00¾@ .01
Red, scrap, mixed	lb.	.02 @ .03
White scrap, mixed	lb.	.02 @ .03
Tires		
Pneumatic		
Auto peelings	lb.	.01⅜@ .02
Bicycle	lb.	.01 @
Standard white auto	lb.	.01½@ .02
Mixed auto	lb.	.01 @
Stripped, unguaranteed	lb.	.00¾@
Solid		
Carriage	lb.	.01¾@ .02
Irony	lb.	.00½@ .00¾
Truck, clean	lb.	.01¾@ .02

WORLD COTTON SITUATION

On July 31, 1922, the world stock of American cotton was 5,123,000 bales and world stocks of all kinds of cotton (including American) were 9,536,000 bales. Adding this season's production of 9,964,000 bales of American cotton and 17,664,000 bales of all kinds, we get a total supply for the season 1922-23 of 15,087,000 bales of American and 27,200,000 bales of all kinds. This is less by about 2¼ million bales of American and the same amount of all kinds than the supply for 1921-22.

From this total supply subtract the estimated consumption for the year 1922-23 of 12,312,000 bales of American and 20,579,000 of all kinds of cotton and the indicated carry over on next August 1, 1923, is only 2¾ million bales of American and 6½ million of all kinds. That is, the stocks of American cotton will have diminished over 6½ million bales, and stocks of all kinds over 8,000,000 bales within only two years, and will have reached an abnormally low level.

The Cotton Outlook

Statistical Position—World's Production and Consumption—Short American Crops—American Consumption—Spindleage—Stocks—The New Crop

THE cotton situation is one of depleted world supplies at a time of increasing mill activities and growing demand for cotton goods. The outstanding fact is that for the past two years world consumption has averaged somewhat over 20,000,000 bales, or some 4,000,000 bales annually more than world production, with the inevitable reduction of carry-over stocks and price advances.

For thirteen years, up to the season of 1921-22, and notwithstanding the record crop of 24,861,000 478-pound bales for the season of 1914-15, average world production and consumption practically kept pace, the former averaging somewhat in excess of the latter. World consumption, which reached 22,533,000 478-pound bales for the season of 1912-13 and dropped to 16,914,000 bales for the season of 1920-21, again jumped to 20,047,000 bales for the season of 1921-22, against a production of only 14,741,000 bales, and is estimated at 20,570,000 bales for the season of 1922-23, against an estimated production of only 17,664,000 bales.

On this basis it is estimated that world stocks, which were 14,752,000 bales on August 1, 1921, and 9,536,000 bales on July 31, 1922, will have been reduced to 6,621,000 bales on July 31, 1923. Correspondingly it is estimated that stocks of American cotton, which were 9,351,000 bales on August 1, 1921, and 5,123,000 bales on July 31, 1922, will have been reduced to 2,775,000 bales on July 31, 1923. In other words, world stocks will have diminished over 8,000,000 bales and stocks of American cotton over 6,500,000 bales in only two years and the carry-over will have reached an abnormally low level. Unless this season's production is materially increased, or consumption unexpectedly falls off, consumption for the season of 1923-24 may be limited to the yield of the crop of 1923.

Meanwhile the present firm price tendency may be expected to continue until such time as the statistical position may take a more favorable turn. As long as the present maladjustment continues between supply and demand, high prices for both raw material and finished goods are inevitable.

World Production and Consumption

World production and consumption estimates for the season of 1922-23, compared with actual statistics for 1921-22, as compiled by the United States Department of Commerce, follow:

	Season of 1921-1922		Season of 1922-1923	
	Production Bales	Consumption Bales	Production Bales	Consumption Bales
United States	7,954,000	5,904,000	[1] 9,964,000	[1] 6,400,000
Europe:				
United Kingdom	.....	2,948,000	.....	3,100,000
Continent	(2)	4,823,000	(2)	4,523,000
British India	3,360,000	1,947,000	3,750,000	1,950,000
Egypt	837,000	(2)	1,050,000	(2)
Japan	(2)	2,275,000	(2)	2,500,000
China	1,175,000	(2)	1,500,000	(2)
Brazil	612,000	(2)	545,000	(2)
All other countries	803,000	2,150,000	855,000	2,106,000
Total bales	14,741,000	17,664,000	17,664,000	20,579,000

[1] Subject to revision when final ginning returns are received.
[2] Included in all other countries.

Reasons for Short American Crops

Last year's American cotton crop of 9,964,000 478-pound bales, although 2,010,000 bales more than for the season of 1921-22, was 2,222,570 less than the yearly average of 12,186,570 bales for the past fourteen years. The short crops since 1920 have been due to a combination of unfortunate circumstances unlikely soon to occur again. Among the most important causes may be mentioned reduced acreage following the big crop and low prices of 1920; insect depredations; adverse weather conditions; scarcity of labor and capital; increasing field costs; the tendency toward crop diversification; the increasing need of fertilizer, and inadequate transportation facilities for developing new fields of cultivation. Of them all, boll weevil depredations was the biggest handicap.

The decline in the average of cotton area in the United States and in British India, during the most recent of the three periods is almost identical in extent, being 991,000 acres in the United States and 1,001,000 acres in India.

American Consumption

During the first half of the cotton year the United States consumed 3,272,597 bales and exported 3,584,270 bales, a total of 6,856,867 bales. This total had increased to 7,509,000 bales at the end of February, compared with 7,330,000 last year. At the same rate for the second half of the year total takings for the entire year will be 13,713,734. On July 31, 1922, the end of the crop year, American carry-over stocks totaled 2,828,000 bales of cotton, compared with 6,534,000 bales in 1921 and 3,563,000 bales in 1920. Adding the 1922-23 crop of 9,964,000 bales makes a total supply of 12,792,000 bales, or 911,734 bales short of the probable demand. Technically, at the present rate of consumption the supply will be exhausted before the new crop is ready.

Active Spindles

Active cotton spindles throughout the United States increased from 30,359,843 in January, 1913, to 35,240,853 in January this year, having passed the 35,000,000 mark for the first time. In the cotton growing states the number increased from 11,740,465 to 15,966,294 during the same period, indicating that the growth of cotton spinning in these states is largely responsible for the increased activity. In February this year the country's active spindleage increased to 35,307,707.

Stocks

Stocks of cotton on hand at the end of the first half of the cotton year, January 31, 1923, in consuming establishments were 1,986,605 bales of lint and 143,004 of linters, compared with 1,668,668 bales of lint and 172,341 of linters on January 31, last year; in public storage and at compresses 3,481,689 bales of lint and 45,821 bales of linters, compared with 4,621,708 bales of lint and 132,963 of linters a year previous, making a total of 5,468,294 bales of lint and 188,925 of linters compared with 6,290,376 bales of lint and 305,304 of linters a year previous. At the end of February stocks in consuming establishments had been reduced to 2,021,903 bales and in warehouses to 2,809,494 bales, a total of 4,831,397 bales compared with 5,818,412 bales a year previous.

The Next Cotton Crop

New crop prospects are generally favorable and plans are being made for the largest American cotton acreage that can be planted under existing labor, financial, and other conditions; this despite the propaganda of certain farm organizations to the contrary. Last year's high prices have put many growers back on their feet financially, enabling them to buy more fertilizer and insecticide, and to cultivate more intensively than last year. Bankers and merchants no longer hold the whip hand, and with the prospect that the normal carry-over will be wiped out before a new crop is brought on the market growers believe that prices for the 1923-24 crop will be profitable, even should the yield be brought up to the pre-war average.

The Market for Cotton and Other Fabrics

New York

AMERICAN COTTON. The course of the market for spot middlings the past few weeks was marked by two violent slumps and corresponding reactions. The first slump carried the price down from 31-30 cents, March 19 to 28.55 cents, April 3. This drop was succeeded by an upward reaction of considerable strength which restored the 30 cent level for a few days between the 6th and 10th, when a second violent downward movement began sending the price to 27.30 cents on April 23, before a strong recovery was developed which succeeded in regaining an advance to 29 cents on April 26. A downward turn is predicted between May 15 and October 15 of this year.

The strong downward break is attributed to the prevalence of extremely bearish views of the general cotton situation overlooking those factors which in the long run will control the market and cause it to react from either extreme point reached.

Despite delays to farm work in the South, due to rains and low temperature, the expectation is prevalent of a materially increased yield this year. A greater and more intelligent effort will doubtless be made to control the boll weevil. This with liberal use of fertilizer on the larger acreage to be planted is depended upon to produce an increased yield per acre and a 13,000,000 bale crop.

EGYPTIAN COTTON. Boston quotation for Medium Sakellaridis March 31 was 36 cents and again the same on April 21, during the intervening two weeks having been quoted at 36½ and 37 cents. Medium Uppers on the dates named were quoted 34 and 34½ cents, respectively, and during the intervening two weeks, 33¾ and 34¼ cents. The slump in American cotton was attributed as the cause of the drop in Egyptian. Considerable spot accumulations of both Sak and Uppers were reported April 21 as available at 1 to 2 cents a pound below quotations at Alexandria. Prediction is made that the coming crop area will be slightly in excess of that of the past season.

SEA ISLAND. This grade is neglected and is in small supply. Small lots of extra choice have recently been sold at 38 cents.

ARIZONA COTTON. The supply of Arizona Pima cotton is dwindling. April 18, No. 1 Pima was quoted at 39½ cents, and No. 2 at 38½ cents.

Cotton Fabrics

DUCKS, DRILLS AND OSNABURGS. This division is marked by general quiet, with the mills unconcerned. They are well sold up in most constructions. Enameling ducks are scarce in some wide widths.

RAINCOAT FABRICS. Business has quieted down recently due to the slump in raw cotton, and buyers are only purchasing their spot requirements. If raw cotton strengthens, marked activity may be expected as stocks on hand are low.

SHEETINGS. Consumers are reported to be buying only for current needs and general quiet prevails.

HOLLANDS. The market is quiet and prices unchanged.

TIRE FABRICS. The market is reported very quiet. Cotton may be higher but the market for fabric lacks strength to follow. Quotations: A few minor changes both ways compared to one month ago.

New York Quotations

April 26, 1923

Prices subject to change without notice

Burlaps			
40—7-ounce	100 yds.	$6.80	@$6.90
40—7½-ounce		7.00	@ 7.10
36—8-ounce		6.00	@ 6.10
40—8-ounce		7.00	@ 7.15
40—10-ounce		8.10	@
40—10½-ounce		8.15	@
Drills			
38-inch 2.00-yard	yard	.25½	@
40-inch 3.47-yard		.15	@
52-inch 1.90-yard		.28	@
60-inch 1.52-yard		.34⅛	@
Duck			
CARRIAGE CLOTH			
38-inch 2.00-yard	yard	.26½	@
40-inch 1.47-yard		.35⅛	@
72-inch 16.66 ounce		.57½	@
72-inch 17.21-ounce		.59¼	@
MECHANICAL			
Hose	pound	.48	@
Belting		.49	@
Osnaburgs			
40-inch 2.35-yard	yard	.23	@
40-inch 2.48-yard		.21⅞	@
40-inch 3.00-yard		.18	@
37½-inch 2.42-yard		.22⅛	@
Tennis			
51-inch 1.35-yard	yard	.42½	@
Hollands			
DEAD FINISH			
Standard, 37-inch, white and colors	yard	*.20	@
42-inch, white and colors		*.24	@
FLAT FINISH			
Imperial, 36-inch, white and colors		*.16	@
40-inch, white and colors		*.18	@

*Nominal.

Raincoat Fabrics			
COTTON			
Bombazine 64 x 60	yard	.15	@
60 x 48		.13	@
Cashmeres, cotton and wool, 36-inch, tan			@
Plaids 60 x 48		.14½	@
56 x 44		.13¾	@
Surface prints 60 x 48		.15¼	@
64 x 60		.16¼	@
Sheetings, 40-inch			
48x48, 2.50-yard	yard	.19¼	@
48x48, 2.85-yard		.16⅜	@
64 x 68, 3.15-yard		16¼	@
56 x 60, 3.60-yard		.14½	@
48 x 44, 3.75-yard		.13	@
44 x 44, 5.50-yard		.10¼	@
Sheetings, 36-inch			
48 x 48, 5.00-yard	yard	.09¾	@
40 x 40, 6.00-yard		.08	@
44 x 40, 6.00-yard		.08	@
Silks			
Canton, 38-inch	yard	.37¼	@
Schappe, 35-inch		*.50	@
Tire Fabrics			
BUILDING			
17¼-ounce Sakellaridis, combed	pound	.80	@
17¼-ounce Egyptian, combed		.73	@ .75
17¼-ounce Egyptian, carded		.70	@
17¼-ounce Peeler, carded		.65	@ .68
CORD			
15-ounce Egyptian, combed	pound	.76	@ .80
15-ounce Egyptian, carded		.73	@ .75
2½-pick Peeler, carded		.68	@ .70
BICYCLE			
8-ounce American	pound		@
10-ounce American			@
BREAKER			
Leno, Peeler, carded		.65	@ .68
CHAFER			
9¼-ounce Egyptian, carded	pound	.78	@ .80
9¼-ounce Peeler, carded		.73	@ .76

The Market for Chemicals and Compounding Ingredients

New York

ALL compounding ingredients and pigments are in very active demand. Rubber makers are pressing for deliveries for current needs and buying ahead cautiously for future requirements. Inadequate railway transportation facilities still hamper free movement of supplies to the mills, in some cases necessitating motor truck delivery or roundabout water route and rail transhipment, increasing cost.

ANILINE. Consumption is steady with prices firm and advance expected. It is selling in drums at 17 cents a pound.

ASBESTINE. This ingredient, popular in mechanical rubber goods manufacture, is moving actively. The best grades are offered at about $20 a ton.

BARYTES. Curtailment of supplies due to French occupation of the Ruhr necessitates strenuous efforts to meet the demand on domestic sources, which is of record proportions.

BENZOL. Consumers are buying less actively than a month ago. Supplies are in good volume at firm prices.

BLANC FIXE. Conditions are essentially the same as for barytes, namely a firm and active market.

CARBON BLACK. Production is oversold at high prices. Domestic demand cannot be supplied adequately, much less the export trade.

CHINA CLAY. The volume of clay passing into rubber goods manufacture is steadily increasing, owing to both cheapness and intrinsic worth as filler and toughener. Prices continue firm and export trade.

DRY COLORS. Dry colors generally are moving freely at satisfactory prices.

LITHARGE. The advance of one cent a pound since January 1 has not halted the requirement and sale of litharge, because all the industries into which it enters largely are at essentially full capacity and their needs tax production capacity on lead products.

LITHOPONE. Record production has been the rule in lithopone mills. The makers are oversold for months in advance. Price advances since the first of the year have been no bar to sales. It is estimated that annual production will reach 140,000 tons by 1924, or nearly double that of 1919.

SUBLIMED LEAD. Essentially the same conditions prevail as in the case of litharge as to production and sales.

SULPHUR. Routine movement without recent price change.

TALC. The usual steady business continues, favoring alike the domestic and foreign products.

SOLVENT NAPHTHA. No spot stock available to meet current requirements. Prices rule firm under this condition.

WHITING. Seasonal routine consumption at unchanged normal prices characterize the sale of both foreign and domestic whiting.

ZINC OXIDE. The sale of zinc oxide exceeds all records and overtaxes production capacity. The heavy tire and rubber goods requirements are expected to continue throughout the year. As in the cases of litharge and lithopone the advance of one cent a pound since the first of this year has not reacted to reduce the sale of zinc oxide.

New York Quotations

April 26, 1923

Accelerators, Inorganic

Lead, carbonate	lb.	$0.09¼	@
Lead, red	lb.	.11½	@
sublimed blue	lb.	.09¼	@
sublimed white	lb.	.09¼	@
Lime, flour, superfine	lb.	.02	@ .02½
Litharge, domestic	lb.	*.10½	@ .12
imported	lb.	*.17	@
Magnesia, carbonate, light	lb.	.08	@ .09
calcined, light (bbls.)	lb.	.23	@ .24
calcined, ex. light (bbls.)	lb.	.45	@
calcined, md. light (bbls.)	lb.	.15	@
calcined, heavy (bbls.)	lb.	.05	@
oxide, heavy	lb.	.05¼	@ .06½
Orange mineral A.A.A.	lb.	.14½	@

Accelerators, Organic

Accelerene (f. o. b. English port)	lb.	13s.	@
Accelemal	lb.		@
Aldehyde ammonia crystals	lb.	.90	@ .95
Aniline (f. o. b.) factory	lb.	.17	@ .18
Cryline	lb.	.60	@
Diphenylguanidine	lb.		@
Ethylidene aniline	lb.	.70	@ .85
Excellerex	lb.	.40	@ .45
Formaldehyde aniline	lb.	.15	@ .16
H. R.	lb.	1.40	@ 1.50
Hexamethylene tetramine	lb.	.95	@ .97½
Lead oleate (bbls.)	lb.	.18	@
Methylene aniline	lb.	.38	@ .42
Methylene paratoluidine	lb.		@
No. 500 Rubber	lb.		@
No. 801 Rubber	lb.		@
No. 999	lb.	$0.17	@
Paradin	lb.	.38	@
Paraldehyde	lb.	.17	@ .19
Paranitrose-dimethylaniline Base	lb.	1.30	@
Paraphenylene diamine	lb.	1.55	@ 1.60
Super-sulphur, No. 1	lb.	.50	@ .60
No. 2	lb.	.25	@ .30
Super-X	lb.	.40	@
Super-XX	lb.		@
Tetramethylthiuramdisulphide	lb.	6.00	@
Thiocarbanilide	lb.	.26	@ .35
Vul-Ko-Cene	lb.		@
XLO	lb.		@

*Nominal.

Acids

Acetic 28% (bbls.)	cwt.	$3.17½	@$3.92½
glacial, 99%	cwt.	12.05	@12.85
Cresylic (97% straw color)	gal.		@
(95 dark)	gal.		@
Sulphuric, 66 degrees	ton	14.00	@16.00

Alkalies

Caustic soda	lb.	.03½	@ .03¾

Colors

BLACK

Bone, powdered	lb.	$0.05½	@$0.07½
Carbon black	lb.	.20	@ .25
pressed	lb.	.21	@ .26
Dipped goods	lb.		@
Drop	lb.	.07½	@ .16
Gritless black	lb.	.40	@
Hyposulphite of lead	lb.		@
Ivory black	lb.	.15	@ .45
Lampblack	lb.	.12	@ .40
Micronex	lb.		@

BLUE

Cobalt	lb.	.21	@ .26
Dipped goods	lb.		@
Gritless blue	lb.	3.50	@
Prussian	lb.	.55	@ .60
Ultramarine	lb.	.15	@ .35

BROWN

Iron Oxide	lb.	.04½	@ .05
Sienna, Italian	lb.	.06½	@ .08
Umber, Turkey	lb.	.05½	@ .06½

GREEN

Chrome, light	lb.	.32	@ .34
medium	lb.	.35	@ .36
dark	lb.	.36	@ .45
commercial	lb.	.12	@
tile	lb.	.13	@ .15
Dipped goods	lb.		@
Gritless green	lb.	3.50	@
Guignet	lb.		@
Oxide of chromium	lb.	.55	@ .67

RED

Antimony, crimson, T. K.	lb.		@
crimson, 15/17% free	lb.	$0.36	@$0.45
crimson, R.M.P. No. 3.	lb.	.50	@
crimson F.	lb.	.35	@
red sulphuret, free, F.S.	lb.		@
Antimony, golden, T. K.	lb.		@
golden R.M.P. No. 7	lb.	.21	@
golden, 15/17% free	lb.	.18½	@ .22
golden, No. 1	lb.	.30	@
golden, No. 2	lb.	.25	@
7-A	lb.	.35	@
vermilion, T. K.	lb.		@
vermilion 15/17% F. S.	lb.	.50	@
vermilion 5% F. S.	lb.	.65	@
red sulphuret	lb.		@
Arsenic sulphide, red	lb.	.15	@
lemon	lb.		@
orange	lb.		@
Cadmium sulphide, red	lb.	2.00	@
Dipped goods red	lb.		@
purple	lb.		@
orange	lb.		@
Gritless red (four shades)	lb.	3.50	@
purple	lb.	2.50	@
Indian	lb.	.08	@ .12
Indian maroon, English	lb.	.12½	@
Iron oxide, reduced	lb.	.08	@ .12
pure bright	lb.		@
Maroon oxide	lb.	.08	@ .12
Red oxide, crimson	lb.		@
English	lb.	.12	@ .14
Spanish	lb.	.03	@ .04
Oximony	lb.	.16	@
Para toner	lb.	1.25	@ 1.50
Spanish natural	lb.	.03½	@ .04½
Toluidine toner	lb.	2.75	@ 3.00
Venetian	lb.	.03½	@ .06
Vermilion, American	lb.	.25	@ .30
English quicksilver	lb.	1.35	@ 1.40

Chemical Market—*Continued*

New York Quotations

April 26, 1923

Colors—*Continued*

WHITE

Albalith	lb.	$0.07 @	$0.07½
Aluminum bronze	lb.	.55 @	.60
Lithopone, domestic	lb.	.06¾ @	.07½
Red Seal, imported	lb.	.06½ @	.07
Zinc oxide:			
AAA	lb.	@	
American Horse Head			
Special	lb.	.08½ @	.09
XX red	lb.	.08 @	.08½
French process, Florence			
Green seal	lb.	.10¾ @	.11¼
Red Seal	lb.	.09¾ @	.10¼
White seal	lb.	.12 @	.12¼
imported	lb.	@	
Azo (factory):			
ZZZ (lead free)	lb.	.08 @	.08½
ZZ (—5% leaded)	lb.	.07¼ @	.07¾
Z (8.10% leaded)	lb.	.07 @	.07½
Zinc sulphide	lb.	@	

YELLOW

Arsenic, yellow	lb.	1.00 @	
Cadmium, sulphide, light	lb.	2.00 @	
Chrome, light and med	lb.	.20 @	.21
Dipped goods	lb.	@	
Gritless yellow	lb.	3.50 @	
India rubber	lb.	.87½ @	
Ochre, domestic	lb.	.02 @	.03
imported	lb.	.03¼ @	.04

Compounding Ingredients

Aluminum flake (carloads)	ton	29.00 @	
hydrate, light	lb.	.19 @	.21
Ammonia carbonate	lb.	.07¾ @	.10½
Asbestine (carloads)	ton	20.00 @	
Aluminum silicate	ton	22.50 @	25.00
Barium, carbonate, precip.	ton	69.00 @	
dust	ton	100.00 @	
Barytes, pure white C. L.	ton	23.90 @	
off color (carloads)	ton	20.00 @	
uniform floated (carloads)	ton	23.90 @	
Basofor	lb.	.04¾ @	
Blanc fixe	lb.	$0.04¼ @	$0.04½
Carrara filler (factory)	lb.	.01¾ @	
Chalk, precip. extra light	lb.	.04¼ @	.05
heavy (f.o.b. factory)	lb.	.03¼ @	.04
China clay, Dixie	ton	22.00 @	32.00
Blue ribbon (carloads)	ton	14.00 @	
Blue Ridge	ton	20.00 @	30.00
Butcher clay (carloads)	ton	@	
Cotton flock, black	lb.	.12 @	
light-colored	lb.	.13 @	.15
white	lb.	.16½ @	.20
Cotton linters clean mill-run	lb.	.08 @	
Fossil flour (powdered)	ton	60.00 @	
(bolted)	ton	60.00 @	
Glue, high grade	lb.	.30 @	.40
medium	lb.	.20 @	.26
low grade	lb.	.16 @	.19
Graphite, flake	lb.	.05 @	
amorphous	lb.	.05 @	
Infusorial earth (powd.)	ton	60.00 @	
(bolted)	ton	65.00 @	
Mica, powdered	lb.	*.15 @	
Pumice stone, powdered	lb.	.03 @	.05
Rotten st., powd. (bbls.)	lb.	.02½ @	.04½
Silica, gold bond (factory)	ton	31.00 @	
silver bond (factory)	ton	25.00 @	
Soap bark, cut	lb.	.08½ @	.09
Soapstone, powdered, gray	ton	12.00 @	

*Nominal.

Sodium bicarbonate (bbls.)	lb.	$0.02¼ @	
Starch, powd. corn (bags)	cwt.	3.07 @	3.17
(bbls.)	cwt.	3.34 @	3.44
Talc, soapstone	ton	15.00 @	20.00
Terra blanche	ton	25.00 @	30.00
Tripoli flour, cream or rose	ton	@	
white (factory)	ton	@	
Tyrelith	ton	@	
Whiting, Alba	cwt.	@	
chalk	ton	@	
commercial	cwt.	1.05 @	1.25
Danish (factory)	ton	20.00 @	
English cliffstone	cwt.	1.70 @	2.25
gilders (bolted)	cwt.	1.10 @	1.15
K. T.	ton	@	
Paris, white, American	cwt.	1.25 @	1.50
Perfection (carloads)	ton	20.00 @	25.00
Plymouth	ton	@	
Quaker	ton	13.00 @	15.00
Superfine, L. H. B.	ton	13.00 @	25.00
Wood pulp, XXX	ton	35.00 @	
X (f. o. b. factory)	ton	25.00 @	

Mineral Rubber

Gilsonite	ton	65.00 @	
Genasco (factory)	ton	50.00 @	52.00
Hard hydrocarbon	ton	33.00 @	42.00
Liquid rubber	lb.	.15 @	
Soft hydrocarbon	ton	32.50 @	38.00
320/340 M. P. hydrocarbon	ton	45.00 @	50.00
300/310 M. P. hydrocarbon	ton	40.00 @	45.00
Pioneer, M. R., solid (fac.)	ton	42.00 @	44.00
M. R. granular	ton	52.00 @	54.00
Robertson, M. R., solid	ton	35.00 @	75.00
M. R. granular (factory)	ton	54.50 @	72.50
Rubrax (factory)	ton	60.00 @	
States "A"	ton	@	
No. 1	ton	@	
Synpro, gran. M. R. (fac.)	ton	55.00 @	70.00

Oils

Avoilas compound	lb.	@	
Castor, No. 1, U. S. P.	lb.	.15 @	
No. 3, U. S. P.	lb.	.14¾ @	
Corn	lb.	.13 @	
Cotton	lb.	.13½ @	
Cycline	gal.	.35 @	.38
Glycerine	lb.	.18 @	.20
Halowax, No. 1000 (500-lb. drums)	lb.	.25 @	.27
No. 1001	lb.	.38 @	.40
Linseed, raw	gal.	1.25 @	
Palm lagos	lb.	.08½ @	.08¾
Palm, niger	lb.	.09½ @	
Peanut	lb.	.15 @	
Petrolatum, standard	lb.	@	
Petrolatum, sticky	lb.	@	
Pine, steam distilled	gal.	.70 @	.72
Rapeseed, refined	gal.	.88 @	
blown	gal.	1.00 @	
Rosin	gal.	.48 @	.50
Synpro	gal.	@	
Soya bean	lb.	.13 @	
Tar	gal.	.27 @	.28

Resins and Pitches

Cumar resin hard	lb.	@	
soft	lb.	@	
Tar, pine, retort	bbl.	$11.75 @	$12.50
kiln	bbl.	12.00 @	13.50
Pitch, Burgundy	lb.	.05 @	
coal tar	lb.	.01½ @	
Fluxol hardwood	ton	40.00 @	60.00
pine tar	lb.	.03 @	
ponto	lb.	.08 @	
Rosin, K (bbl.)	280 lbs.	6.85 @	
strained (bbls.)	280 lbs.	6.65 @	
Shellac, fine orange	lb.	*.90 @	

Solvents

Acetone (98.99% drums [6.62 lbs. per gal.])	lb.	@	
Benzol (90% drums [7.21 lbs. per gal.])	gal.	@	
pure (drums)	gal.	.42 @	
Carbon bisulphide (drms. [10.81 lbs. per gal.])	lb.	.06¾ @	.07
tetrachloride (drums, [13.23 lbs. per gal.])	lb	.09½ @	.10½
Motor gasoline (steel bbls.)	gal.	.24½ @	
Naphtha, V. M. & P.	gal.	.23½ @	
solvent (drums extra)	gal.	.26½ @	
Cymene (factory)	gal.	1.50 @	
Toluol, pure (7.21 lbs. per gal.)	gal.	@	
Turpentine, spirits	gal.	1.50 @	
wood, steam distilled	gal.	1.40 @	

Substitutes

Black	lb.	.09½ @	.14
Brown	lb.	.10 @	.15
White	lb.	.09½ @	.16½
Brown factice	lb.	.08 @	.15
White factice	lb.	.09 @	.15
T. K. factice	lb.	@	

Vulcanizing Ingredients

Black hypo	lb.	.38 @	
13%	lb.	@	
Sulphur chloride (drums)	lb.	.08 @	
(jugs)	lb.	.13½ @	
Sulphur, Bergenport brand, 100% pure (bbls.)	cwt.	2.70 @	3.05
(bags)	cwt.	2.45 @	2.80
Sulphur flour (bbls.)	cwt.	2.75 @	3.30
(bags)	cwt.	2.50 @	3.05
Superfine 100% pure	cwt.	@	

(See also Colors—Antimony)

Waxes

Wax, beeswax, white, com	lb.	.45 @	
ceresine, white	lb.	.12 @	
carnauba	lb.	.20 @	
montan	lb.	.04½ @	.05
ozokerite, black	lb.	.18 @	
green	lb.	.27 @	
paraffine	lb.	.03 @	.05¾
sweet wax	lb.	.10 @	.12

Miscellaneous

Saturating material	lb.	@	
Finishing material	lb.	@	
Insulating compound	lb.	@	
Battery sealing compound	lb.	@	

TIRE NEEDS OF THE TAXICAB

According to tabulations recently prepared by *Cab News*, the taxicabs of this country use annually 972,000 pneumatic casings and 324,000 inner tubes, while the amount of brake lining necessary is estimated at 2,250,000 feet. The individual taxicab requires annually 10.8 casings and 28 feet of brake lining.

SWEDISH INTERNATIONAL AUTOMOBILE EXHIBITION

The next Swedish International Automobile Exhibition will be held in conjunction with the Goteborg Jubilee Exposition, from May 8 to July 15, 1923, and should prove of interest to American tire manufacturers, as it is said that almost 75 per cent of the 29,462 cars and trucks in use in Sweden are American products. The market for accessories is also an excellent one. According to *Commerce Reports*, the registration of motor vehicles in Sweden for 1922 will be more than doubled within the next decade.

FIRESTONE UNIVERSITY SCHOLARSHIP AGAIN OFFERED

For the fourth consecutive year Harvey S. Firestone, president of The Firestone Tire & Rubber Co., Akron, Ohio, has offered a four years' university scholarship to high school students who wish to compete in the good roads essay contest. All high school students of the United States are eligible, the subject for this year being: "The Influence of Highway Transport Upon the Religious Life of My Community." All inquiries should be address to the Highway Education Board, Washington, D. C.

U. S. CHAMBER OF COMMERCE TO DISCUSS EUROPEAN PROBLEMS

The coming meeting of the Chamber of Commerce of the United States to be held May 7-11 at the Waldorf-Astoria, New York, N. Y., will include especially discussions regarding the solution of the reparations problem and other economic difficulties with which Europe is at present faced.

INDIA RUBBER WORLD
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GUTTA-PERCHA Reg. United Kingdom.

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